Mackenzie Valley Highway
Terrain Mapping and IFEA Alignment Analysis

Prepared for:

Government of Northwest Territories
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1 INTRODUCTION

The Government of the Northwest Territories Department of Infrastructure (GNWT-INF) is advancing work on the proposed Mackenzie Valley Highway (MVH) project between Wrigley and Norman Wells. Following an email request received from the GNWT-INF on March 18, 2022, K'alo-Stantec Limited (K'alo-Stantec) has presented a proposal to complete additional terrain mapping and a road alignment analysis for the MVH segment located between Mount Gaudet and Prohibition Creek.

Authorization to proceed was received on July 27, 2022 (SC-INF01-5898).

1.1 Background

In March 2022, GNWT approved an "Issued for EA (IFEA) alignment" as the centerline of a 1 kilometer (km) wide corridor to be used as the basis for the environmental assessment of the MVH project. This IFEA alignment was based on updating previous "PDR alignments" with tie-ins to bridges as detailed in the Memo Issued for Environmental Assessment (IFEA) Horizontal Alignment Study Corridor for the Mackenzie Valley Highway (Wrigley to Norman Wells) Project (K'alo-Stantec 2022).

It is important to note that at this early stage, the IFEA alignment centerline is not yet a "design alignment", in the sense that the proposed route still needs to be checked and improved for compliance with horizontal and vertical control criteria. K'alo-Stantec has presented a separate proposal to the GNWT to conduct this work (refer to K'alo-Stantec Proposal for Advancing the Design within the Horizontal Alignment Routing Corridor for the Mackenzie Valley Highway).

Some terrain mapping and alignment analyses have been conducted for the MVH project in the past. This includes the compilation of regional scale mapping by the Geological Survey of Canada (GSC), as well as more detailed terrain mapping completed for the Prohibition Creek Access Road (PCAR) located south of Norman Wells (G.V.M. 2016), as well as along the Mount Gaudet Access Road (MGAR) located north of Wrigley (G.V.M. 2019). Additional terrain mapping was completed by K'alo-Stantec (2020) for a 1 km-wide Local Study Area (LSA) corridor centered on the Mackenzie Valley Winter Road (MVWR) between Wrigley and Norman Wells to support the environmental assessment required for the project.

Other terrain-related tasks completed by K'alo-Stantec for the MVH include the compilation and review of scientific literature, existing geotechnical reports, existing publications and maps released by the GSC (e.g., Duk-Rodkin 2002; Duk-Rodkin and Couch 2004; Duk-Rodkin and Huntley 2009; Côté et al. 2013; GSC 2019a,b) and other subconsultant (G.V.M. 2016, 2019) as well as terrain mapping completed for the Mackenzie Valley Pipeline (Imperial Oil Resources Ventures Limited 2006).

The mapping data listed above, alongside baseline data relevant to soils, terrain and permafrost conditions was presented in a Technical Data Report (TDR) initially submitted to the GNWT in December of 2020.

1.2 Scope of Work

The scope of work for terrain mapping and IFEA alignment analysis consisted of the following:

Terrain Mapping: To extend K'alo-Stantec LSA terrain mapping from the current 1 km-wide corridor to a 4 km-wide corridor. This additional mapping was limited to specific areas (mainly stream crossings) which were previously identified by K'alo-Stantec and Tetra Tech during a presentation to GNWT (November 25, 2021) as being of design concern (see Table 1). A review of existing terrain mapping at a series of pipeline crossing locations was also included.

Table 1 Previously Identified Areas of Design Concern Along the IFEA Alignment

Area of Interest	Nearest IFEA Kilometer Station (KM)	Main Concern
Ochre River	725	Moderate to steep natural slopes at river crossings may translate in grade profiles more than 10%
Whitesand Creek	734	
Vermillion Creek South	752	
Dam Creek	765	
Blackwater River	785	
Steep Creek	816	
Devil's Canyon	828	
Saline River	832	
Seagrams Creek	844	
Little Smith Creek	852	
Gotcha Creek	913	
Twelve Mile Creek	922	
Pipeline crossing	795.2 820.5 914.2 915.8	Crossing of Enbridge's Line 21 pipeline
Moose pasture	712-716	Known moose habitat; area of great ecological and cultural values

Alignment Route Analysis: To assess the suitability of the IFEA alignment centerline based on terrain conditions (i.e., without evaluation of geometric design elements). The area of interest for this analysis consisted of the alignment centerline segment separating Mount Gaudet and Prohibition Creek. The end-goal of the highway routing analysis is the identification of a single best alignment within the approved IFEA alignment corridor so that it can be used as the basis for future design.

2 METHODOLOGY

2.1 Terrain Mapping

The mapping focused on classifying and describing the terrain conditions surrounding areas of design concern as listed in Table 1 by considering local physical terrain attributes (e.g., topography, surficial materials, drainage), with a special attention to physical constraints (e.g., wetlands, steep slopes) and geoprocesses (e.g., permafrost degradation, mass movements).

This mapping was completed using ESRI ArcGIS software, through the interpretation of available project orthoimagery and Light Detection and Ranging (LiDAR) data acquired by the GNWT. The produced data was added to existing 1:10,000 scale terrain mapping previously produced by K'alo-Stantec as part of the soils, terrain and permafrost TDR. The updated digital mapping files are available for distribution.

It is important to note that terrain mapping completed by K'alo-Stantec to date was conducted as part of desktop studies, and that field validation specifically intended in refining the delineation and classification of the individual map units (also referred as terrain polygons) has not yet been completed. Field data obtained from external data sources; however, were accounted for while conducting the mapping.

2.2 Alignment Route Analysis

The alignment route analysis was completed by visualizing terrain conditions using different mapping platforms while allowing for the consultations of aerial imagery, LiDAR data, terrain mapping and other digital datasets that have been compiled for the project to date (e.g., geotechnical borehole data). Of special interest was to review the terrain conditions along the IFEA alignment using two separate LiDAR dataset (i.e., data acquired in 2010 and 2021) and allowing to conduct topographic change detection assessments.

The findings of the alignment route analysis consist of a list of locations (or alignment segments) where terrain conditions may have a potential adverse impact(s) on the design, construction and/or operation of the MVH. These locations, along with a summary description, are presented in tabular using the IFEA alignment kilometer stationing as linear spatial reference (see Table 3). Areas characterized by terrain where no major apparent constraints and/or geoprocesses were noted are not listed in this table.

Where applicable, optimization to the alignment centerline were proposed (e.g., where a better route was available to avoid adverse terrain conditions). Note that these proposed reroutes to the alignment centerline are located within the GNWT approved IFEA route corridor, with the optimized alignment matching the existing structures at the water crossings. Note however, that the optimization of the horizontal and vertical alignment at the areas of design concern identified in Table 1 were not part of the current scope.

To inform the project design team on the conditions along the alignment centerline, a KM-by-KM summary of terrain map units crossed by the IFEA alignment centerline was developed. This tabular summary (Appendix B) presents both the map unit labels developed as part of the terrain mapping as well as a simplified "terrain type" classification crossed by the alignment centerline. A set of key terrain types (Table 2) was developed by the project team at the beginning of the current scope of work based on professional judgment to inform upcoming design activities.

Table 2 Terrain Types Used to Inform Design of the MVH

Key Terrain Type	Dominant Surficial Material	Description
1	Till, glaciofluvial, fluvial	Ice-poor till and other sandy to gravelly deposits; relatively dry, apparently stable; commonly overlain by a thin organic topsoil layer
2	Glaciolacustrine, eolian, colluvial	Ice-medium to ice-rich silts and clays deposits with minor sand and gravel component, moderately to imperfectly drained areas; commonly overlaid by moderate organic cover
3	Organic	Ice-rich organic deposits; peatlands containing thermokarst depressions

3 FINDINGS

The key focus of the route analysis was to identify and describe site conditions that could have adverse impact(s) on the design, construction and/or operation of the MVH. These conditions refer to terrain-related constraints (i.e., characteristics or features that are likely to pose a challenge to the construction, operation, or maintenance of the future infrastructure) and/or geohazards (i.e., geological conditions that may lead to localized or widespread damage to property, threaten personal safety or cause environmental degradation).

A summary of these located are listed and briefly described in Table 3. Typical examples of terrain-related and geohazards identified along the IFEA alignment are presented in a series of screen captures (Figure 1 to Figure 6). These mainly refer to the following terrain conditions:

- Suspected ice-rich soils or areas showing signs of permafrost degradation (thermokarst),
- Moderately to steeply inclined terrain that may result in steep vertical alignment,
- Areas showing landslide activity,
- Wetlands and other areas characterized by thick organic topsoil,
- Areas where drainage and soils surface erosion may be problematic.

Information contained in this table is available in GIS shapefile or KML format.

Refer to the km-by-km summary of terrain map units crossed by the IFEA alignment located terrain mapping geodatabase (ArcGIS geodatabase format) for additional spatial information on terrain conditions within the IFEA alignment corridor.

Table 3 Summary of Terrain Related Constraints Along the IFEA Alignment – Dehcho Region (KM 715 – 796)

AOI (IFEA KMs)	Feature Type	Description	Proposed Follow-up Action
715 to 718.5	permafrost - thermokarst	Alignment crosses series of wetlands showing signs of thermokarst; a reroute to the south to bypass this area is proposed	consider rerouting
724	drainage and erosion	Alignment crosses a small stream twice. Adjusting alignment geometry may allow to realign the route further east avoid the stream	consider rerouting
725.87	stream crossing	Ochre River; the north bridge abutment is located on an outside river bend susceptible to erosion	consider monitoring
725.88	steep slope	Ochre River valley; steep escarpment along upper terrace; grading would imply deep cut or thick fill; landslide observed along same terrain unit some 400 m upstream	consider rerouting
728-729	drainage and erosion	Alignment crosses area showing signs of seepage and soil surface erosion; erosion noted downstream of embankment	design consideration (erosion control)
733.75	stream crossing	Whitesand Creek; north abutment on outside bank susceptible to erosion	consider monitoring
736.5 to 736.7	drainage and erosion	Recent (<10 years old) erosion noted along stream channel immediately below for alignment; consider moving the alignment further upslope, above from the area subject to erosion	consider rerouting
740 to 756	landslide activity	Multiple (100+) active layer detachments upslope from the alignment along this 16 km segment; the landslides (several active within the last 10 years) are 100 m to 300 m in length and have developed along a 20% clay/silt escarpment.	terrain stability field program
740.2	landslide activity	LiDAR hillshade image suggests upper limit of possible earthflow along a small gully some 20m downslope from the alignment	terrain stability field program
741.55	drainage and erosion	Erosion noted immediately downslope from the existing RoW	design consideration (erosion control)
743	landslide activity	Toe of landslide (active layer detachment) located 60 m upslope from the alignment centerline; several similar features in the area.	terrain stability field program
744.6	drainage and erosion	Recent (<10 years old) erosion noted along stream channel immediately below for alignment	design consideration (erosion control)
745.8	drainage and erosion	Recent (<10 years old) erosion noted along stream channel immediately below for alignment	design consideration (erosion control)
748.28	drainage and erosion	Mass movement along the right bank of the Strawberry Creek; erosion noted alongside the embankment, north from the small culvert; current alignment characterized by steep grades, culverts appear too short and allowing for erosion of the embankment	design consideration (erosion control)

AOI (IFEA KMs)	Feature Type	Description	Proposed Follow-up Action
748.58	drainage and erosion	Erosion noted alongside the existing RoW	design consideration (erosion control)
750.15	drainage and erosion	Recent (<10 years old) erosion of the existing embankment fill at the stream crossing	design consideration (erosion control)
750.58	drainage and erosion	Erosion of the embankment at the gully crossing	design consideration (erosion control)
752.25	landslide activity	Vermillion Creek South; landslide activity along the river valley upstream from the crossing	terrain stability field program
753.7	landslide activity	Toe of shallow landslide reaching the alignment; reroute proposed to stay away from landslide runoff zone	consider rerouting
754.13	landslide activity	Landslide runoff crossing the alignment	terrain stability field program
755.550 to 756	drainage and erosion	Erosion alongside and across the alignment on the southbound approach to Bob's Canyon Creek; a series of small landslides are visible on the SW-facing slope	terrain stability field program
757	landslide activity	Deep-seated retrogressive landslides located 250 m downslope from the alignment	terrain stability field program
759.56	drainage and erosion	Presence of a poorly defined flow path indicative of groundwater seepage	design consideration (cross drainage)
760.5	drainage and erosion	Poorly defined flow path with signs of seepage; thermokarst in wetland 400m upslope from alignment	design consideration (cross drainage)
764.4 to 764.6	landslide activity	Alignment crosses a slope characterized by several active layer detachments; no apparent movement in the last 10 years however steep natural slope imply road cut may by required, which could impact slope stability; consider rerouting	field reconnaissance; consider rerouting
764.185	channel migration, landslide	Dam Creek crossing; sinuous stream showing signs of channel migration; several landslides along the river valley	design consideration (erosion control)
765 to 765.5	landslide activity	Alignment immediately downslope from an escarpment characterized by several active layer detachments; no apparent movement in the last 10 years	terrain stability field program
768.5	wetland	Alignment crosses a small (<1 ha) wetland	consider rerouting
769.35	drainage and erosion	Alignment alongside small sinuous creek showing signs of channel migration	consider rerouting
770.6	wetland	Alignment crosses a small (<1 ha) wetland	consider rerouting
786 to 786.5	landslide activity	Alignment located along the outside limit of the Blackwater River floodplain, 50 m from the river valley slope characterized by several landslides; the toe of the nearest landslide reaches the proposed alignment; no LiDAR data to inform on recent (10 years) activity	terrain stability field program

AOI (IFEA KMs)	Feature Type	Description	Proposed Follow-up Action
787 to 787.9	landslide activity	Alignment crosses escarpment slope characterized by several earthflows; No LiDAR data to inform on recent (10 years) activity	terrain stability field program
788.4 to 785.150	permafrost - thermokarst	Alignment crosses terrain unit displaying signs of thermokarst	design consideration (ice-rich permafrost)
789.840 to 790.360	permafrost - thermokarst	Alignment crosses terrain unit displaying signs of thermokarst	design consideration (ice-rich permafrost)

Table 4 Summary of Terrain Related Constraints Along the IFEA Alignment – Sahtu Region (KM 796 - 985)

AOI (IFEA KMs)	Feature Type	Description	Proposed Follow-up Action
799.5 to 802	permafrost - ice wedges	Bare-earth LiDAR shows the area to be characterized by ice-wedge polygons; features likely not limited to this location, however, may not be visible on the LiDAR data	design consideration (ice-rich permafrost)
811.5 to 812.3	permafrost - ice wedges	Bare-earth LiDAR shows the area to be characterized by ice-wedge polygons; features likely not limited to this location, however, may not be visible on the LiDAR data	design consideration (ice-rich permafrost)
815 to 816	landslide activity	Alignment crosses escarpment characterized by an old deep-seated landslide (above from KM 816)	terrain stability field program
817 to 818	drainage and erosion	Alignment crosses escarpment characterized by gullying and suspected slow mass movement	terrain stability field program
827 to 828	drainage and erosion	Numerous poorly defined drainage flow paths; LiDAR hillshade suggests the area is characterized by significant seepage	design consideration (cross drainage)
832	landslide activity	Saline River; landslide activity along the south-facing slope leading to the river	terrain stability field program
851.6	landslide activity	Alignment located approximately 130 m upslope from the headscarp of a landslide	terrain stability field program
852 to 853	landslide activity	Little Smith Creek river valley; north valley side slope characterized by several landslides; limited routing options due to steep terrain	design consideration (terrain stability)
855.4 to 856	drainage and erosion	Alignment above from gully system; confirm potential for soil surface erosion and mass movements	terrain stability field program
857.5 to 857.9	wetland	Alignment crosses wetland showing potential for permafrost degradation	design consideration (ice-rich permafrost)
860 to 860.8	drainage and erosion	Seepage and soil surface erosion noted alongside the existing RoW	design consideration (erosion control)
874	landslide activity	Alignment approximately 320 m upslope from the edge of retrogressive thaw slump; landslide activity observed from LiDAR and orthoimagery	terrain stability field program
875.7	wetland	Alignment in poorly drained terrain located between two wetlands; significant seepage expected in the area	design consideration (cross drainage)
875.750 to 876	wetland	Alignment in fine-grained soils with frequent wetlands; potential for ice-rich permafrost	terrain stability field program
876 to 876.7	landslide activity	Alignment approximately 200 m upslope from the edge of retrogressive thaw slump; landslide activity observed from LiDAR and orthoimagery	terrain stability field program
876.7 to 877.3	wetland	Alignment in fine-grained soils with frequent wetlands; potential for ice-rich permafrost	terrain stability field program
878 to 879	wetland	Alignment in fine-grained soils with frequent wetlands; potential for ice-rich permafrost	terrain stability field program

AOI (IFEA KMs)	Feature Type	Description	Proposed Follow-up Action
882 to 883	landslide activity	Alignment approximately 220 m upslope from the edge of a retrogressive thaw slump; landslide activity observed from LiDAR and orthoimagery	terrain stability field program
885 to 886	landslide activity	Alignment approximately 200 m upslope from edge of retrogressive thaw slump; landslide activity observed from LiDAR and orthoimagery	terrain stability field program
886 to 887	wetland	Alignment in fine-grained soils with frequent wetlands; potential for ice-rich permafrost	terrain stability field program
899.8	wetland	Alignment in poorly drained terrain located between two wetlands; significant seepage expected in the area	design consideration (cross drainage)
904.15	surficial material	Confirm suitability of material for cut slope and inline borrow; cut slope would allow improving alignment geometry by straightening the route	include in future geotechnical field investigation
907.3	surficial material	Confirm suitability of ridge material for cut slope and inline borrow	include in future geotechnical field investigation
912.6	drainage and erosion	Gotcha Creek; rill erosion visible downslope from the alignment on the short valley side slopes leading to the stream crossing	design consideration (erosion control)
917	wetland	Alignment immediately alongside (east) of wetland with open water; signs of thermokarst in the area	design consideration (ice-rich permafrost)
922	landslide activity	Twelve Mile Creek Bridge; signs of mass movements along the gully system leading to the stream crossing; ground disturbance could impact terrain stability	terrain stability field program
923 to 928	permafrost	Wetland area suggesting thick organic accumulation, poor drainage and potential for ice-rich permafrost; signs of thermokarst in the area	terrain stability field program
971.5	drainage and erosion	Notta Creek; suspected beaver dam across the stream channel 25 m upstream from existing bridge; localized flooding upstream visible on 2020 imagery compared to 2010; potential hydrotechnical hazard	terrain stability field program
973.4	stream crossing	Vermillion Creek North; sinuous stream showing potential for scouring and channel migration, especially the left bank immediately upstream from the south bridge abutment	consider monitoring
974 to 976	permafrost - thermokarst	Potential thermokarst occurring around a series of small lakes and wetlands between KM 974 to 976	design consideration (ice-rich permafrost)

Figure 1 Wetland Presenting Signs of Thermokarst Between IFEA KMs 715 to 718.5

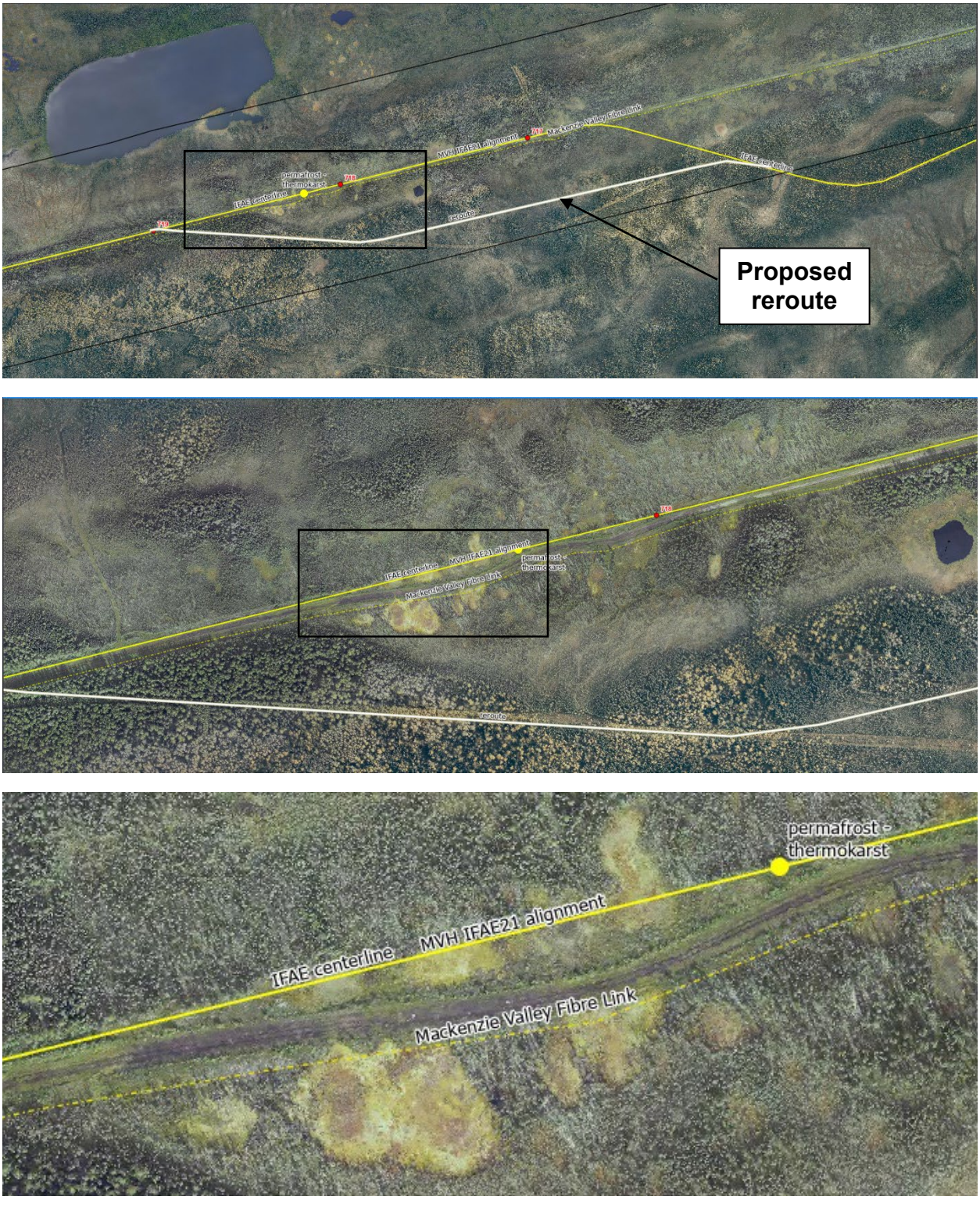


Figure 2 Ochre River Valley (KM 725-726), Steep Escarpments Along Upper River Terrace, Potential Fluvial Erosion

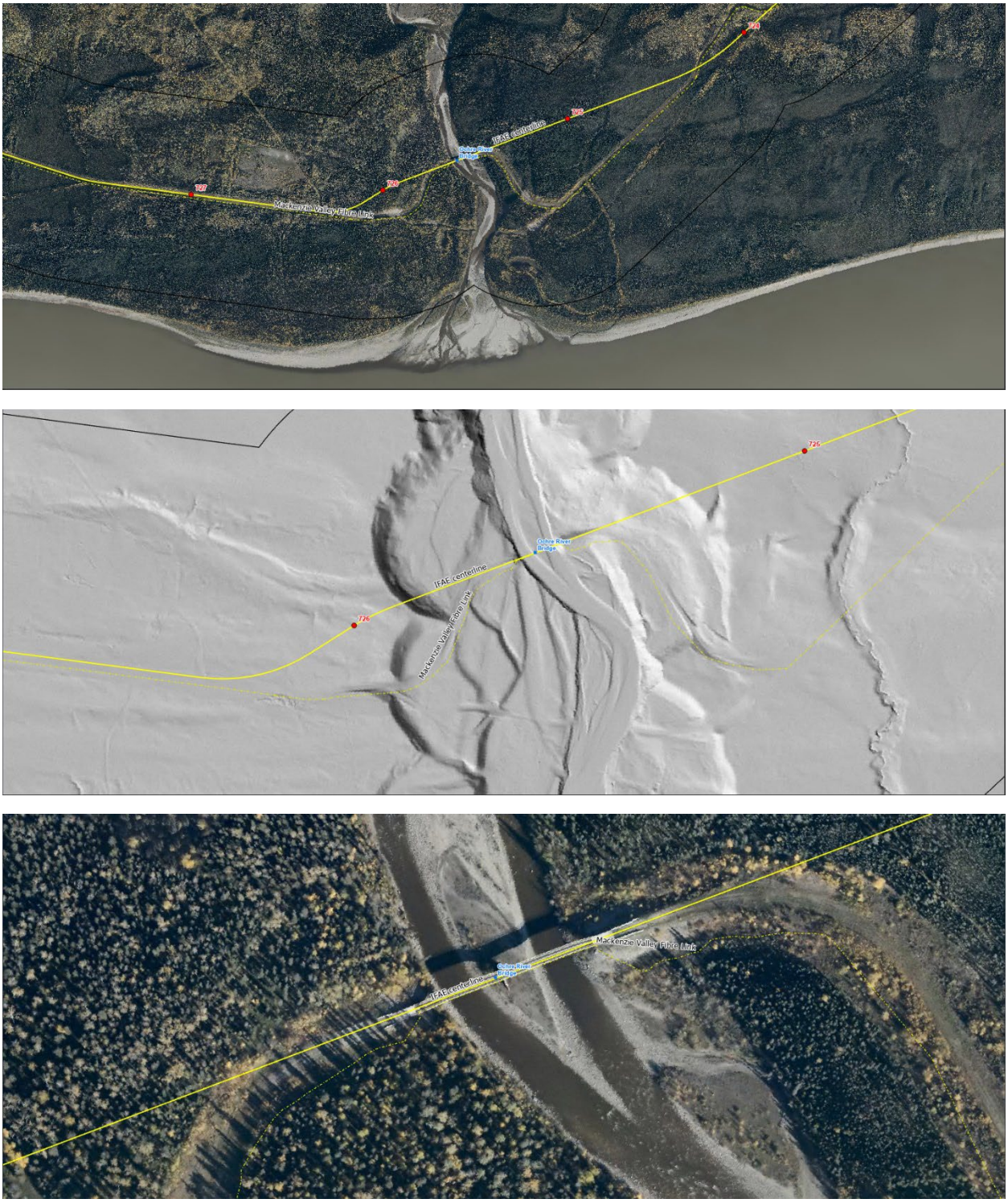
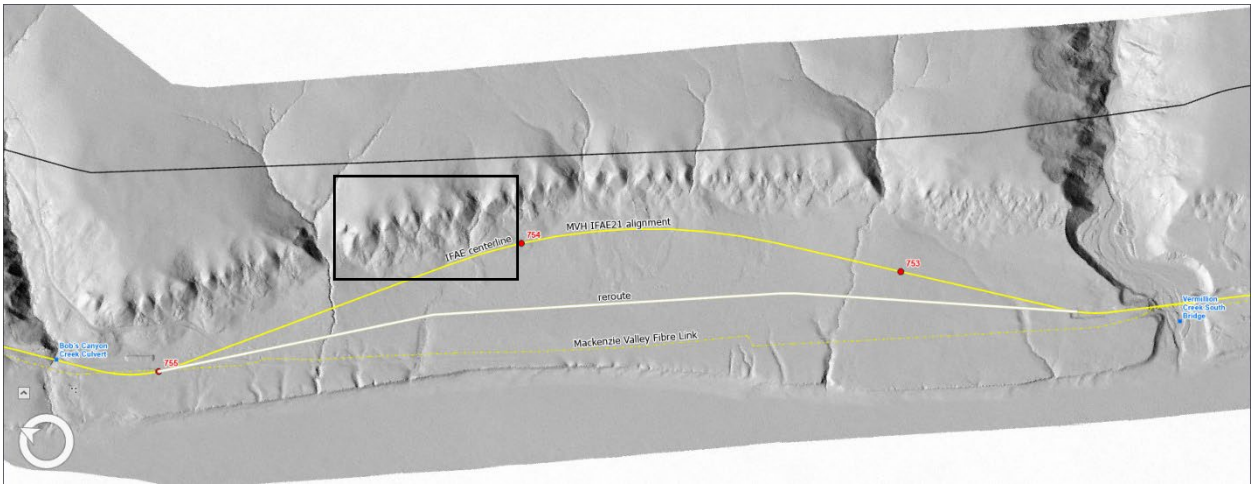


Figure 3 **Landslide Activity Upslope from the Alignment Near Bob's Canyon (KM 753 to 754); Reroute Proposed to Stay Away from Runoff Zone**



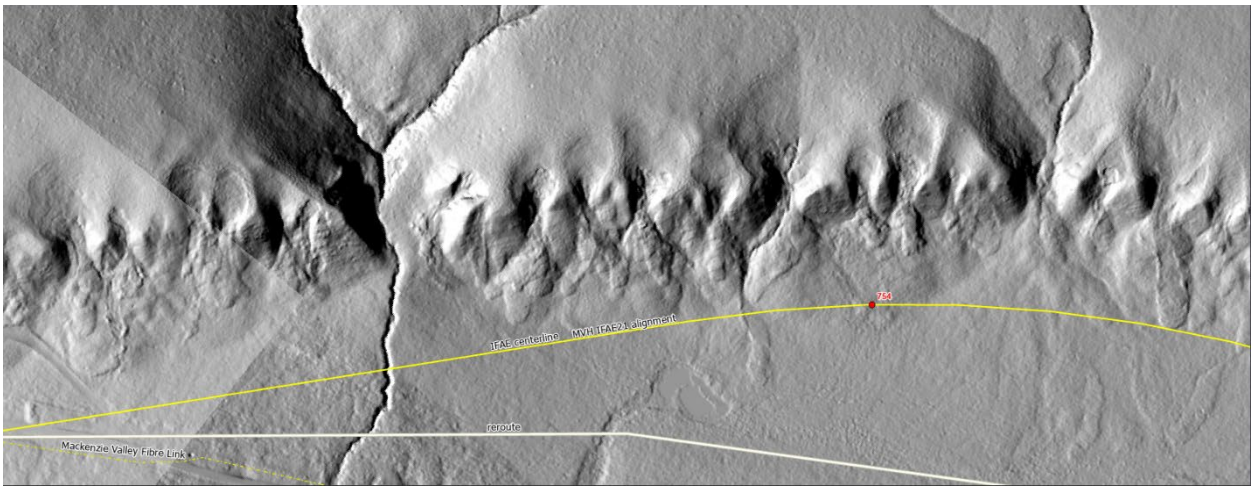


Figure 4 Alignment Crosses a Small Wetland at KM 768.5

Figure 5 Seepage and Erosion Alongside the Existing RoW between KM 860 and 861

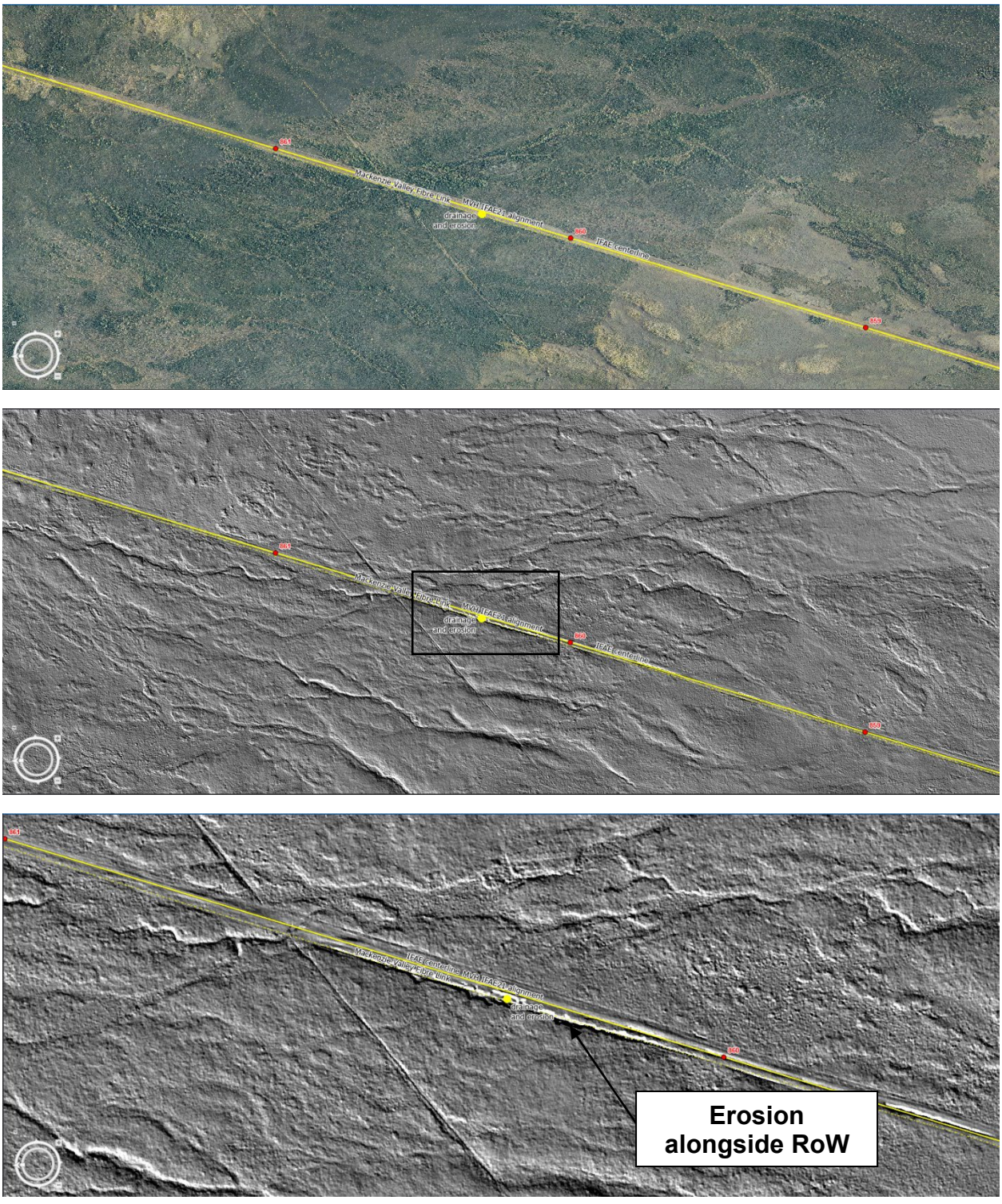
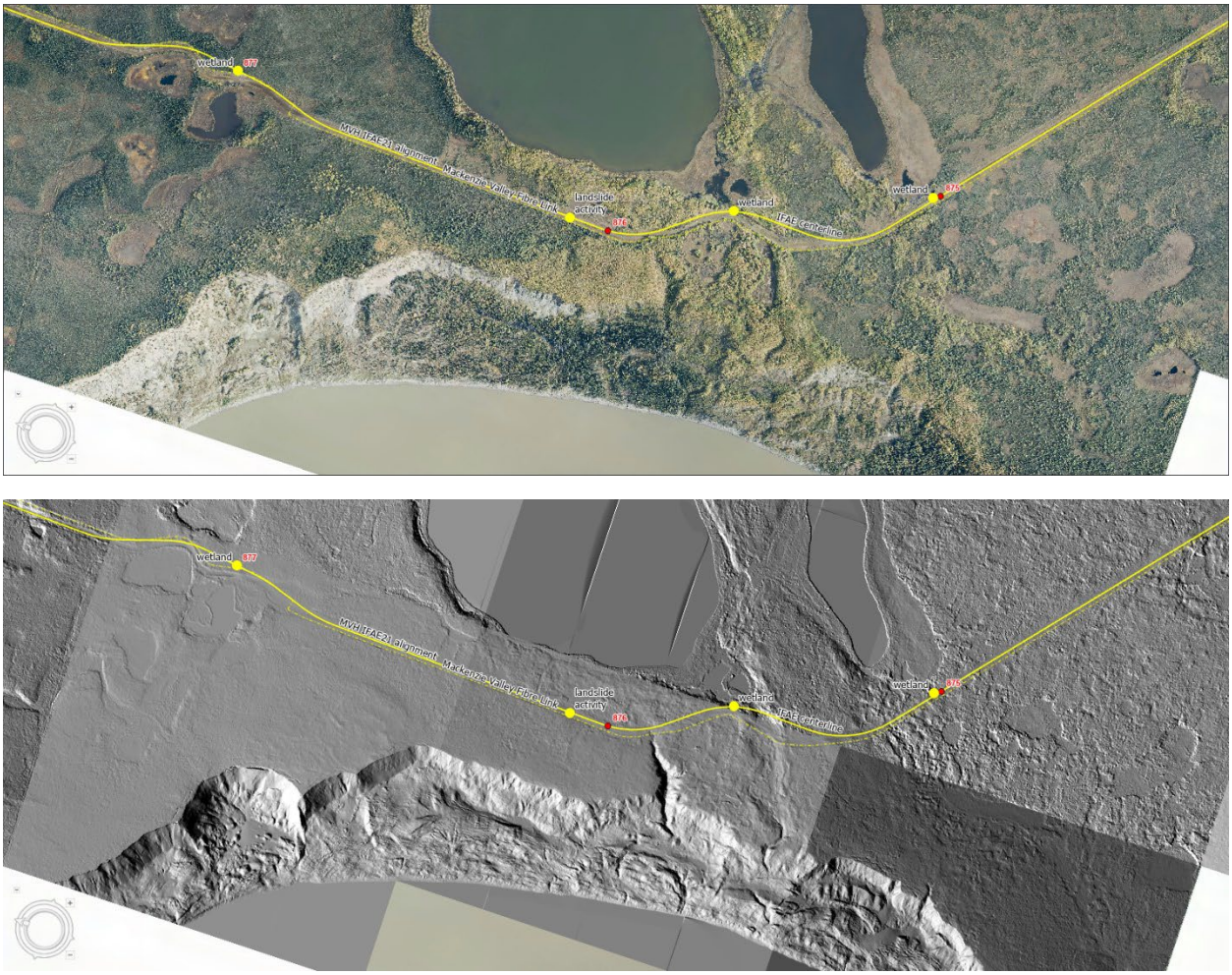


Figure 6 Deep seated Landslides Approximately 200 m Downslope from the Alignment Near KM 876



3.1 Recommendation for Future Work

The following recommendations should be considered:

- Observations and findings summarized in this report should be reviewed in parallel with the GIS mapping data. The recommended approach is to visualize terrain conditions using available high-resolution orthoimagery and bare-earth LiDAR hillshade images. K'alo-Stantec remains available to guide the GNWT with the interpretation of terrain conditions along the IFEA alignment.
- Findings listed in Table 3 (Dehcho Region) and Table 4 (Sahtu Region) include proposed follow-up actions consisting of the following:
    - Consider rerouting
    - Design consideration (erosion control)
    - Design consideration (ice-rich permafrost)
    - Consider monitoring (e.g., potential shoreline erosion at bridge location)
    - Include in future geotechnical field investigation (i.e., to confirm soil properties)
    - Terrain stability field program (to support a landslide risk assessment)
- As numerous landslides were identified within the IFEA corridor (some intersecting the alignment centerline) It is recommends that a terrain stability field program be conducted to better understand how these hazards could impact both the design and operation of the highway. Findings of this field program would allow for the completion of a landslide risk assessment. Upon request, K'alo-Stantec's Geohazard and Geomorphology Team, supported by our geotechnical group, is available to propose a scope work.
- The next step in advancing the highway alignment design should be to optimize both the horizontal and vertical geometry of the alignment centerline while accounting for the terrain conditions compiled as part of the current analysis. This work should be completed in a staged process, i.e., first focusing on resolving the horizontal and vertical design at the stream crossing locations (Table 1) where additional terrain mapping was completed.

4 CLOSURE

We trust that the information contained in this report is adequate for your present purposes. If you have any questions about the contents of this document, or if we can be of any other assistance, please do not hesitate to contact us at your convenience.

Respectfully submitted,

K'ALO-STANTEC LIMITED

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APPENDIX A Statement of General Conditions

USE OF THIS REPORT: This report has been prepared for the sole benefit of the Client and may not be used by any third party without the express written consent of Stantec, which may be withheld at Stantec's discretion. Any use which a third party makes of this report is the responsibility of such third party.

BASIS OF THE REPORT: The information, opinions, and/or recommendations made in this report are in accordance with Stantec's present understanding of the specific site and project scope as described by the Client. The contents of this report are applicable only to the site conditions encountered at the time of the investigation or study. If the proposed project differs or is modified from what is described in this report or if the site conditions are altered, this report is no longer valid unless Stantec is engaged by the Client to review and revise the report to reflect the differing or modified project specifics and/or the altered site conditions.

STANDARD OF CARE: Preparation of this report, and all associated work, was carried out in accordance with the reasonable skill and diligence required by customarily accepted professional practices and procedures normally provided in the performance of such services at the time when and the location in which the services were performed. No other warranty is made.

INTERPRETATION OF SITE CONDITIONS: Soil, rock, and/or other material descriptions, and statements regarding their condition, made in this report are based on site conditions encountered by Stantec at the time of the work at specific field observation locations and/or through interpretation of both digital imagery and/or LiDAR data. Classifications and statements of condition have been made based on anticipated behavior of the materials or geomorphic processes and are interpretive in nature; no specific description should be considered exact, but rather should be considered reflective of the anticipated behaviour of materials or geomorphic processes. Extrapolation of in situ conditions can only be made to some limited extent beyond the observed locations. The extent depends on variability of the soil, superficial materials, bedrock, soil moisture and groundwater conditions as influenced by geological processes, construction activity, and land use.

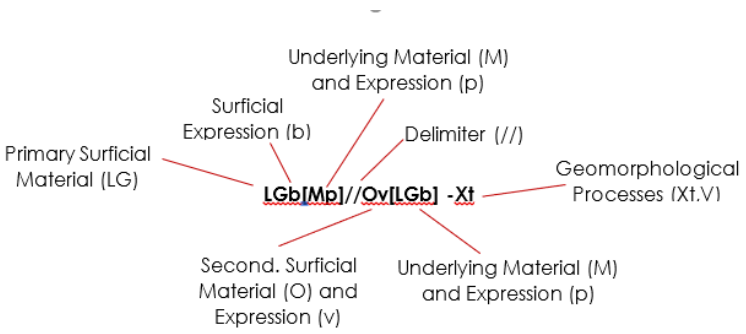
VARYING OR UNEXPECTED CONDITIONS: Should any site or subsurface conditions be encountered that are different from those described in this report, Stantec must be notified immediately to assess if the varying or unexpected conditions are substantial and if reassessments of the report conclusions or recommendations are required. Stantec will not be responsible to any party for damages incurred as a result of failing to notify Stantec that differing site or sub-surface conditions are present.

PLANNING, DESIGN, OR CONSTRUCTION: Development or design plans and specifications should be reviewed by Stantec, sufficiently in advance initiating the next project stage (property acquisition, tender, construction, etc.), to confirm that this report adequately addresses the elaborated project specifics and that the contents of this report have been properly interpreted. Specialty quality assurance services (field observations and testing) during construction are a necessary part of the evaluation of sub-subsurface conditions and site preparation works. Site work relating to the recommendations included in this report should only be carried out in the presence of a qualified engineer or geoscientist; Stantec cannot be responsible for site work carried out without its representative being present.

APPENDIX B

KM-by-KM Summary of Terrain Map Units Crossed by the IFEA Alignment Centerline

Legend for Interpretation of Materials, Geoprocesses, and Terrain Types



Surficial Material

Anthropogenic	A
Colluvium	C
Fluvial	F
Glaciofluvial	FG
Glaciolacustrine	LG
Till	T
Water Body	N
Organic	O
Bedrock	R

Surface Expression

moderate slope (27-49%)	a
blanket (> 1 m)	b
cone	c
depression	d
fan	f
hummocky	h
gentle slope (6-26%)	j
moderate steep slope (50-70%)	k
rolling	m
plain	p
ridged	r
steep slope (>70%)	s
terraced	t
undulating	u
veneer (< 1 m)	v

Geomorphological Processes

Permafrost Processes	
Thermokarst	Xt
Thaw flow	Xf
Ice wedge	Xw
Thermo-erosion	Xe
Mass Movement Processes	
Slow mass movement	F
Tension crack	Fk
Rapid mass movement	R
Rockfall	Rb
Debris flow	Rd
Debris slide/avalanche	Rs
Rotational slump	Ru
Hydrological Processes	
Channeled by meltwater	E
Kettled	H
Surface seepage	L
Inundation	U
Gullying	V

Delimiters and Qualifiers

/	The component in front of the symbol is more extensive than the one that follows
//	The component in front of the symbol is considerably more extensive than the component that follows
^	Geomorphological process initiation zone
A	Active

Key Terrain Type	Dominant Surficial Material	Description
1	Till, glaciofluvial, fluvial	Ice-poor till and other sandy to gravelly deposits; relatively dry, apparently stable; commonly overlain by a thin organic topsoil layer
2	Glaciolacustrine, eolian, colluvial	Ice-medium to ice-rich silts and clays deposits with minor sand and gravel component, moderately to imperfectly drained areas; commonly overlaid by moderate organic cover
3	Organic	Ice-rich organic deposits; peatlands containing thermokarst depressions

IFAE KM start	IFAE KM finish	Segment Length (m)	Materials[1]	Geoprocess	Terrain Type
695+501	695+589	88	FGt		1
695+589	695+666	77	Cv[FGa]		2
695+666	695+785	119	Ft		1
695+785	695+800	15	FAp		1
695+800	695+868	68	Ft		1
695+868	696+017	149	Cb[FGj]		2
696+017	696+066	49	FGt		1
696+066	696+094	28	FGj		1
696+094	696+121	27	FGt		1
696+121	696+316	194	FGj		1
696+316	696+752	436	FGt		1
696+752	697+389	637	FGju		1
697+389	697+438	49	FGj	L	1
697+438	698+034	596	FGju//Cv[FGju]		1
698+034	698+249	215	LGj//Cv[LGj]	V	2
698+249	698+714	465	LGp		2
698+714	698+741	26	Cv[LGja]	V	2
698+741	698+799	58	LGp		2
698+799	698+947	148	Cv[LGja]	V	2
698+947	699+864	917	LGp		2
699+864	699+906	42	Cv[LGja]	V	2
699+906	700+270	364	LGp		2
700+270	700+331	61	Cv[LGaj]	V	2
700+331	700+664	332	LGp		2
700+664	700+819	155	Ov[LGp]/LGp		3
700+819	701+203	384	LGp//Eu		2
701+203	701+301	98	Ob[LGp]		3
701+301	701+588	287	LGp//Eu		2
701+588	701+854	266	LGp		2
701+854	701+884	31	Ov[LGp]	Xt	3
701+884	702+169	285	LGp		2
702+169	702+294	125	Ov[LGp]		3
702+294	702+560	266	LGp		2
702+560	702+669	109	Ov[LGp]	Xt	3
702+669	702+831	162	LGp		2
702+831	702+917	86	Ov[LGp]	Xt	3
702+917	702+955	38	LGp		2

[1] Refer to terrain map legend located at the beginning of Appendix B

IFAE KM start	IFAE KM finish	Segment Length (m)	Materials[1]	Geoprocess	Terrain Type
702+955	703+026	71	LGp	L	2
703+026	703+295	269	LGp		2
703+295	703+393	98	Ov[LGp]	Xt	3
703+393	703+983	590	LGb[Mp]		2
703+983	704+005	22	LGp	L	2
704+005	704+559	554	LGb[Mp]		2
704+559	704+573	14	Ov[LGp]//LGp	Xt	3
704+573	706+172	1,599	LGb[Mp]		2
706+172	706+191	19	LGb[Mja]	V,L	2
706+191	707+510	1,319	LGb[Mp]		2
707+510	708+081	571	Ov[LGp]/LGp	L,Xt	3
708+081	708+312	231	Ov[LGb]/LGb[Mp]		3
708+312	708+636	324	Ov[LGp]/LGp	L,Xt	3
708+636	708+784	148	Ov[LGb]/LGb[Mp]		3
708+784	709+850	1,067	Ov[LGp]/LGp	L,Xt	3
709+850	711+402	1,543	LGb[Mp]		2
711+402	711+518	113	LGb[Mp]	L	2
711+518	711+942	415	LGb[Mp]		2
711+942	712+197	250	Ov[LGb]/LGb[Mp]		3
712+197	712+436	234	Mu		1
712+436	712+564	125	Ov[LGb]/LGb[Mp]		3
712+564	712+776	208	LGb[Mu]		2
712+776	712+959	180	Mbv[Rh]		1
712+959	715+410	2,400	LGb[Mu]		2
715+410	715+531	119	Cv[Mj]	E	2
715+531	715+631	98	Ov[FGb]	L,E	3
715+631	715+742	109	Cv[Mja]	V	2
715+742	715+809	66	LGb[Mp]		2
715+809	715+867	57	Cv[Mja]	R^u	2
715+867	715+985	115	LGb[Mp]		2
715+985	716+760	759	LGb[Mp]//Ov[LGb]		2
716+760	716+848	86	Ob[LGb]	Xt	3
716+848	716+921	72	Ob[LGb]	Xt	3
716+921	717+200	277	LGb[Mp]		2
717+200	717+434	234	Mu		1
717+434	717+540	106	Ovb[LGb]	Xt	3
717+540	717+736	196	Mu		1
717+736	718+430	693	Ovb[LGb]	Xt	3
718+430	718+726	296	Ov[LGb]//LGb[Mp]		3
718+726	720+847	2,121	Mu		1

IFAE KM start	IFAE KM finish	Segment Length (m)	Materials[1]	Geoprocess	Terrain Type
720+847	722+240	1,393	Ov[LGb]		3
722+240	722+388	148	LGb[Mp]	L	2
722+388	722+500	112	Ov[LGb]/LGb[Mp]		3
722+500	722+530	29	Cv[Mja]	V	2
722+530	723+630	1,101	Ov[LGb]/LGb[Mp]		3
723+630	723+823	192	Mu		1
723+823	724+010	187	Cv[Mja]	V	2
724+010	724+045	35	Mu		1
724+045	724+112	68	Cv[Mja]		2
724+112	724+200	87	Cv[Mja]	V	2
724+200	724+250	51	Cv[Mja]		2
724+250	724+772	522	Ov[FGt]		3
724+772	724+829	57	FAp/Cv[FGja]		1
724+829	725+188	359	FGt		1
725+188	725+202	14	Cv[FGka]	V	2
725+202	725+257	55	FGt		1
725+257	725+440	182	Cv[FGaj]	R	2
725+440	725+552	112	Ft		1
725+552	725+639	87	FAp		1
725+639	725+726	87	Ft		1
725+726	725+784	58	Cv[Fk]		2
725+784	725+836	52	Ft		1
725+836	725+896	60	Cv[FGak]	R^s,u	2
725+896	726+829	934	FGt		1
726+829	727+484	654	FGp		1
727+484	727+496	13	Ov[FGp]		3
727+496	727+527	30	FGt/Ov[FGt]	L	1
727+527	727+906	380	Ov[FGt]		3
727+906	728+087	181	FGt/Ov[FGt]	L	1
728+087	728+211	124	Ov[FGp]		3
728+211	728+277	66	FGt/Ov[FGt]	L	1
728+277	728+438	161	Ov[FGt]		3
728+438	728+629	191	FGt/Ov[FGt]	L	1
728+629	728+656	26	FGu		1
728+656	728+878	222	Ff		1
728+878	728+906	28	FGt/Ov[FGt]	L	1
728+906	729+064	158	Ff		1
729+064	729+226	162	FGt	L	1
729+226	729+611	385	Ff		1
729+611	729+655	44	Ov[FGt]		3

IFAE KM start	IFAE KM finish	Segment Length (m)	Materials[1]	Geoprocess	Terrain Type
729+655	729+875	220	FGp/Ov[FGp]	L	1
729+875	730+207	332	Ov[FGt]		3
730+207	730+290	82	Ff		1
730+290	730+306	16	FAp		1
730+306	730+723	417	Ff		1
730+723	730+827	104	Cj		2
730+827	730+857	30	FGp/Ov[FGp]	L	1
730+857	731+040	182	Cj		2
731+040	731+071	31	FGp/Ov[FGp]	L	1
731+071	731+462	391	Cj		2
731+462	731+550	88	FGp/Ov[FGp]	L	1
731+550	731+827	277	Cb[FGt]		2
731+827	731+857	30	FGp/Ov[FGp]	L	1
731+857	732+228	371	Ov[FGt]		3
732+228	732+317	89	FGp/Ov[FGp]	L	1
732+317	732+423	107	Ov[FGt]		3
732+423	732+732	309	Ff		1
732+732	732+748	16	Ov[FGt]		3
732+748	732+804	55	Ov[FGp]	L	3
732+804	732+928	124	Ov[FGt]		3
732+928	733+033	105	FGp/Ov[FGp]	L	1
733+033	733+467	434	FGt/Ov[FGt]		1
733+467	733+545	77	Caj//Cv[FGa]	R^u	2
733+545	733+712	167	Ft		1
733+712	733+739	27	FAp		1
733+739	733+777	38	Cv[FGak]	R^u	2
733+777	734+708	931	Fpj		1
734+708	735+181	473	FGj		1
735+181	735+422	241	FGp	L	1
735+422	735+787	365	FGj		1
735+787	735+832	45	Cv[FGak]/Fp	V	2
735+832	736+169	337	Ov[FGt]		3
736+169	736+721	552	FGj		1
736+721	736+855	134	FAp/Cvb[FGak]	V	1
736+855	737+033	178	FGt		1
737+033	737+481	448	Cv[FGja]	V	2
737+481	737+502	20	Ov[FGt]//FGt		3
737+502	737+570	68	Cv[FGja]	V	2
737+570	738+053	483	Ov[FGt]//FGt		3
738+053	738+181	128	FGt//Ov[FGt]		1

IFAE KM start	IFAE KM finish	Segment Length (m)	Materials[1]	Geoprocess	Terrain Type
738+181	738+269	87	Cv[FGja]	V	2
738+269	739+420	1,151	FGt//Ov[FGt]		1
739+420	739+509	89	Cv[FGjs]/Fp	V	2
739+509	739+689	180	FGt		1
739+689	739+956	268	Cj		2
739+956	740+101	144	FGt		1
740+101	740+123	22	FAp		1
740+123	740+475	352	Ov[FGt]//FGt		3
740+475	740+523	48	Cj	Xf	2
740+523	740+981	458	Ov[FGt]//FGt		3
740+981	741+070	89	Ff		1
741+070	741+241	171	Ov[FGt]//FGt		3
741+241	741+445	204	Ff		1
741+445	741+473	28	FGp	L	1
741+473	741+633	160	Ff		1
741+633	742+423	790	Ov[FGt]//Cb[FGt]		3
742+423	742+521	99	Cv[Faj]//Fp	V	2
742+521	742+742	220	FGt		1
742+742	743+670	928	Ov[Ft]//Ft		3
743+670	743+723	53	Cv[Fja]//Fp	V	2
743+723	743+998	275	Ov[Ft]//Ft		3
743+998	744+257	259	Ff		1
744+257	744+593	336	Ov[Ft]//Ft		3
744+593	744+688	95	Cv[Fja]/Fp	V	2
744+688	745+700	1,012	Ov[Ft]/Ft		3
745+700	745+777	77	Ff		1
745+777	745+806	29	Cv[Fja]/Fp	V	2
745+806	745+972	166	Ff		1
745+972	746+505	533	Ov[Ft]/Ft		3
746+505	746+592	86	Cb[FGj]	Xf,L	2
746+592	746+900	308	FGj		1
746+900	747+288	388	Ff		1
747+288	748+287	999	FGt//Ov[FGt]		1
748+287	748+376	90	Cv[FGak]	R^s	2
748+376	748+446	70	Ft		1
748+446	748+476	30	FAp		1
748+476	748+562	86	Ft		1
748+562	748+621	59	Cv[FGks]/Cs	R^u,X^f	2
748+621	750+102	1,481	FGt		1
750+102	750+133	31	Cv[FGks]	V	2

IFAE KM start	IFAE KM finish	Segment Length (m)	Materials[1]	Geoprocess	Terrain Type
750+133	750+153	20	FAp		1
750+153	750+170	18	Cv[FGks]	V	2
750+170	750+538	368	FGt		1
750+538	750+590	52	FAp/Cv[FGsk]	V	1
750+590	750+888	297	FGt		1
750+888	751+043	156	Cb[FGt]//FGt		2
751+043	751+061	17	Cv[FGa]/Cja	V	2
751+061	751+276	216	FGja		1
751+276	751+302	26	Cj//Cv[FGa]	V	2
751+302	751+625	323	Cj	F^	2
751+625	752+073	448	Ftj		1
752+073	752+171	97	A		1
752+171	752+242	72	Cv[Fsa]	R^s	2
752+242	752+318	76	FAp		1
752+318	752+347	29	Cv[Fsk]	R^s	2
752+347	752+700	353	Ft		1
752+700	752+763	63	Fj	V	1
752+763	753+000	237	Ft		1
753+000	753+117	117	Ff		1
753+117	753+139	22	Cv[FGja]/Caj	V	2
753+139	753+233	94	Ff		1
753+233	753+308	75	Ov[Ft]		3
753+308	753+586	278	Ft		1
753+586	753+652	66	Cb[Ft]	Xf	2
753+652	753+813	161	Cas	X^f	2
753+813	753+941	128	Cb[Ft]	Xf	2
753+941	754+128	187	Cas	X^f	2
754+128	754+174	46	Cb[Ft]	Xf	2
754+174	754+259	85	Cas	X^f	2
754+259	754+510	251	Ft		1
754+510	754+527	16	Cv[FGja]/Caj	V	2
754+527	755+266	739	Ft		1
755+266	755+286	19	FAp		1
755+286	755+658	372	Cak	X^f	2
755+658	755+890	232	LGj		2
755+890	755+940	49	Cak	V	2
755+940	756+085	146	LGj		2
756+085	756+201	116	Ov[LGp]		3
756+201	757+561	1,359	LGp		2
757+561	757+989	428	Ov[LGp]	Xt	3

IFAE KM start	IFAE KM finish	Segment Length (m)	Materials[1]	Geoprocess	Terrain Type
757+989	758+444	455	Ov[LGp]//LGp		3
758+444	759+023	579	LGp/Ov[LGp]		2
759+023	760+796	1,773	Ov[LGp]//LGp		3
760+796	761+461	665	LGp		2
761+461	762+476	1,016	Ov[LGp]//LGp		3
762+476	762+775	299	LGp		2
762+775	763+289	514	Ov[LGp]/LGp		3
763+289	764+336	1,046	LGp	L	2
764+336	764+736	400	Caj	X^f	2
764+736	764+754	18	FGt		1
764+754	764+761	8	Caj	X^f	2
764+761	764+803	42	Cv[FGak]		2
764+803	764+932	128	FAp		1
764+932	764+968	36	Cv[FGjk]		2
764+968	764+971	3	Cak	X^f	2
764+971	764+973	2	Ca	X^f,V	2
764+973	765+579	607	FGt		1
765+579	765+667	87	Fpj	L	1
765+667	767+491	1,825	FGt//Ov[FGt]		1
767+491	767+540	49	Cv[FGaj]	V	2
767+540	767+739	199	FGt		1
767+739	767+783	44	Cv[FGaj]	V	2
767+783	767+785	2	FGp//Ov[FGp]	L	1
767+785	768+098	313	Ov[FGp]		3
768+098	768+218	121	FGu		1
768+218	768+489	271	Ov[FGp]		3
768+489	768+552	63	Ov[FGp]	Xt	3
768+552	768+709	158	Ov[FGp]		3
768+709	769+196	487	FGp//Ov[FGp]	L	1
769+196	769+264	68	Cv[FGja]	R^u	2
769+264	769+266	2	Ov[FGp]/FGp	L	3
769+266	769+296	30	Cv[FGja]	R^u	2
769+296	770+540	1,244	Ov[FGp]/FGp	L	3
770+540	770+604	64	Ob[FGp]//N		3
770+604	770+649	45	Ov[FGp]/FGp		3
770+649	770+770	121	FGj//Cv[FGja]		1
770+770	771+274	504	Ov[FGp]		3
771+274	771+657	383	FGp/Ov[LGp]		1
771+657	772+733	1,076	FGp//Ov[FGp]	L	1
772+733	772+948	215	FGj	V	1

IFAE KM start	IFAE KM finish	Segment Length (m)	Materials[1]	Geoprocess	Terrain Type
772+948	773+091	144	FGt		1
773+091	773+142	51	FGj	V	1
773+142	773+430	287	FGt		1
773+430	773+770	340	FGj	V	1
773+770	773+812	43	FGt	L	1
773+812	774+044	231	FGj	V	1
774+044	774+135	91	FGt		1
774+135	774+235	100	FGj	V	1
774+235	774+314	79	FGt		1
774+314	774+368	53	FGj	V	1
774+368	774+846	478	FGt		1
774+846	774+879	34	Cv[FGjs]	V	2
774+879	774+924	45	FGt		1
774+924	775+013	89	Cv[FGjs]	V	2
775+013	775+137	123	FGt		1
775+137	775+169	33	Cv[FGja]	V	2
775+169	775+324	155	FGt		1
775+324	775+974	649	FGj		1
775+974	776+124	151	FGt		1
776+124	776+164	40	FAp		1
776+164	776+591	427	FGp		1
776+591	777+216	624	FGu		1
777+216	777+343	128	Ov[FGp]		3
777+343	777+442	98	FGp	L	1
777+442	777+750	308	Ov[FGp]		3
777+750	778+460	710	FGu		1
778+460	778+927	468	FGp		1
778+927	779+372	444	FGu		1
779+372	779+524	153	FGp		1
779+524	781+268	1,744	FGu		1
781+268	782+956	1,688	FGt		1
782+956	783+038	82	FGp	L	1
783+038	784+260	1,222	FGt		1
784+260	784+303	43	FGp	L	1
784+303	784+713	410	Ft		1
784+713	785+126	413	A		1
785+126	785+246	120	Fp		1
785+246	785+335	89	FAp		1
785+335	785+711	375	A		1
785+711	786+364	653	Ft		1

IFAE KM start	IFAE KM finish	Segment Length (m)	Materials[1]	Geoprocess	Terrain Type
786+364	786+492	128	Ft//OvFt		1
786+492	786+789	297	Ff		1
786+789	787+066	277	Ft//OvFt		1
787+066	787+221	155	Ff		1
787+221	787+230	9	Caj	X^f	2
787+230	787+253	23	Cas	V	2
787+253	787+753	501	Caj	X^f	2
787+753	788+135	382	LGp		2
788+135	788+182	47	Cak	V	2
788+182	788+415	233	LGp//Ov[LGp]		2
788+415	788+654	238	Ov[LGp]		3
788+654	789+767	1,113	LGp		2
789+767	789+839	72	Ov[LGp]//LGp		3
789+839	790+344	505	Ob[LGp]	Xt	3
790+344	791+227	883	LGp		2
791+227	791+374	147	Ov[LGp]		3
791+374	791+809	435	LGp		2
791+809	791+870	61	LGp	L	2
791+870	792+683	812	LGu		2
792+683	792+835	152	Ov[LGp]/LGp		3
792+835	793+161	326	LGu		2
793+161	793+230	69	Ob[LGp]//Fp	U	3
793+230	793+338	109	LGj		2
793+338	795+285	1,947	LGp		2
795+285	795+334	49	Cv[LGja]	V	2
795+334	796+262	928	LGp		2
796+262	796+356	94	Cv[LGj]	V	2
796+356	797+188	832	LGp		2
797+188	797+281	93	Cv[LGj]	V	2
797+281	797+922	641	LGp		2
797+922	798+061	139	LGj		2
798+061	798+105	44	FAp		1
798+105	798+572	467	FGp//Ov[FGp]		1
798+572	798+781	209	FGu		1
798+781	799+320	538	Ov[FGp]		3
799+320	799+937	617	FGp	Xw	1
799+937	800+573	636	FGpu		1
800+573	801+746	1,174	FGp	Xw	1
801+746	804+840	3,094	FGp		1
804+840	804+891	50	Ov[FGp]		3

IFAE KM start	IFAE KM finish	Segment Length (m)	Materials[1]	Geoprocess	Terrain Type
804+891	805+184	293	FGp/Ov[FGp]		1
805+184	805+237	53	Ov[FGp]		3
805+237	805+296	59	FAp/ObFp	U	1
805+296	805+706	410	FGp		1
805+706	806+029	323	FGp	L	1
806+029	809+839	3,809	FGp		1
809+839	809+880	41	Cv[FGja]	V	2
809+880	810+597	717	FGp		1
810+597	810+709	113	Ov[FGb]		3
810+709	811+524	815	FGp		1
811+524	812+095	571	FGp	Xw	1
812+095	812+650	554	FGp		1
812+650	812+676	27	Cvb[Maj]	V	2
812+676	812+755	78	FGb[Mp]//Ov[FGb]	L	1
812+755	812+840	86	Cvb[Maj]	V	2
812+840	813+106	266	FGb[Mp]//Ov[FGb]	L	1
813+106	814+504	1,398	FGb[Mp]		1
814+504	814+579	75	Cvb[Mjs]	V,X^f	2
814+579	814+840	261	FGb[Mp]		1
814+840	814+928	88	Cja	V	2
814+928	815+224	297	Caj	X^f	2
815+224	815+358	134	Ff		1
815+358	815+362	3	Ft//Cvb[Ft]		1
815+362	815+412	50	Caj	R^u	2
815+412	816+060	648	Ft//Cvb[Ft]		1
816+060	816+242	182	Caj	R^u	2
816+242	816+473	232	Ft		1
816+473	816+534	61	FAp		1
816+534	816+587	52	Ft		1
816+587	816+946	359	Caj	F^	2
816+946	817+150	204	Ff		1
817+150	817+176	26	Ft//Cv[Ft]	L	1
817+176	817+922	746	Cja	F^,V	2
817+922	818+023	100	FGb[Mp]		1
818+023	818+139	117	Caj	V	2
818+139	818+538	399	FGb[Mp]		1
818+538	818+596	58	FGb[Mp]	L	1
818+596	818+935	339	FGb[Mp]		1
818+935	819+005	70	FGv[Mj]	V	1
819+005	819+226	221	FGu		1

IFAE KM start	IFAE KM finish	Segment Length (m)	Materials[1]	Geoprocess	Terrain Type
819+226	820+065	839	Cv[LGb]	V	2
820+065	820+089	24	Cv[Mp]	L	2
820+089	820+233	144	Cv[LGba]	V	2
820+233	820+521	288	LGb[Mja]		2
820+521	820+634	113	Ov[FGp]	L,E	3
820+634	820+795	161	Cv[Mj]a	V	2
820+795	821+141	346	LGb[Mj]		2
821+141	821+145	4	LGb[Mp]	L	2
821+145	821+247	102	Cv[Mj]a	V	2
821+247	821+458	212	LGb[Mp]		2
821+458	821+501	42	Cv[Mj]a	V	2
821+501	821+730	229	LGb[Mp]		2
821+730	821+880	150	Cv[LGb]	V	2
821+880	822+063	183	LGb[Mp]		2
822+063	822+099	36	Cv[LGb]	V	2
822+099	822+194	95	LGb[Mp]		2
822+194	822+314	120	Cv[LGb]	V	2
822+314	822+409	95	LGb[Mp]		2
822+409	822+547	138	Cv[LGb]	V	2
822+547	822+660	113	LGb[Mp]		2
822+660	822+838	178	Cv[LGb]	V	2
822+838	823+102	264	LGb[Mp]		2
823+102	823+245	143	Cv[LGb]	V	2
823+245	823+473	229	LGb[Mp]		2
823+473	823+594	121	Cv[LGb]	V	2
823+594	824+017	423	LGb[Mp]		2
824+017	824+228	212	Cv[LGb]	V	2
824+228	824+345	116	LGb[Mp]		2
824+345	824+541	196	Cv[LGb]	V	2
824+541	824+763	222	LGb[Mp]		2
824+763	824+872	109	Cv[LGb]	V	2
824+872	824+997	125	LGb[Mp]		2
824+997	825+078	80	Cv[LGb]	V	2
825+078	825+549	471	LGb[Mp]		2
825+549	825+603	55	LGb[Mp]//Ov[LGb]	L	2
825+603	825+750	147	LGb[Mp]		2
825+750	825+760	9	LGb[Mp]//Ov[LGb]	L	2
825+760	825+829	69	Cv[LGb]	V	2
825+829	826+145	316	LGb[Mp]		2
826+145	826+225	80	Cv[LGb]	V	2

IFAE KM start	IFAE KM finish	Segment Length (m)	Materials[1]	Geoprocess	Terrain Type
826+225	826+910	686	LGb[Mp]		2
826+910	827+938	1,027	LGb[Mpj]	L	2
827+938	828+334	396	LGb[Mp]		2
828+334	828+507	174	Cv[Mak]	V,R^s	2
828+507	828+774	267	LGb[Mu]		2
828+774	829+072	297	LGb[Mu]	L,V	2
829+072	829+412	340	LGb[Mp]		2
829+412	830+359	948	LGb[Mpj]	L	2
830+359	830+997	638	FGv[Mp]		1
830+997	831+138	141	Cv[Mj]		2
831+138	831+284	146	FGb[Mp]		1
831+284	831+614	330	Cb[Mja]	F^	2
831+614	831+808	194	Ft//Cv[Ft]		1
831+808	831+919	111	FAp		1
831+919	831+958	38	Ft//CvFt		1
831+958	832+280	322	Cb[Ma]	R^s	2
832+280	832+736	456	Mju		1
832+736	834+051	1,314	Mju	L	1
834+051	834+365	314	Mj		1
834+365	834+394	29	Mju	L	1
834+394	834+579	185	Mj		1
834+579	834+685	106	Mju	L	1
834+685	835+016	331	Mj		1
835+016	835+256	240	Mj	L	1
835+256	835+447	190	Mj		1
835+447	835+793	346	Mj	L	1
835+793	837+384	1,591	Mb[Ru]		1
837+384	837+428	44	Cv[Mb]	V	2
837+428	837+822	394	Mb		1
837+822	837+864	42	Cv[Mb]	V	2
837+864	838+348	484	Mb	L	1
838+348	840+113	1,765	Eu/Mp		2
840+113	841+484	1,371	Mp	L	1
841+484	841+924	440	Eu/Mp		2
841+924	842+524	601	Mu//Ev[Mp]		1
842+524	842+698	174	Mp		1
842+698	842+942	243	Mu//Ev[Mp]		1
842+942	843+245	303	Mp		1
843+245	843+342	97	Mp	L	1
843+342	843+886	545	Mp//Ov[Mp]		2

IFAE KM start	IFAE KM finish	Segment Length (m)	Materials[1]	Geoprocess	Terrain Type
843+886	843+915	28	Cv[Mak]	V	2
843+915	844+120	205	Mp//Ov[Mp]		2
844+120	844+258	138	Cv[Maj]	V	2
844+258	844+390	132	FAp/CvbFp		1
844+390	844+572	182	Cv[Maj]	X^f,V	2
844+572	844+833	261	Mp		1
844+833	845+326	492	Mp	L	1
845+326	845+607	282	Mp		1
845+607	845+716	109	Mp	L	1
845+716	845+792	76	Mp//Ov[Mp]	L	2
845+792	845+892	100	Mp	L	1
845+892	846+301	408	Mp		1
846+301	846+633	332	Mj	V,L	1
846+633	846+740	107	Mj	V	1
846+740	848+066	1,325	Mp		1
848+066	848+175	110	Mp	L	1
848+175	849+357	1,182	Mp		1
849+357	850+250	894	FGb[Mp]		1
850+250	850+281	31	Cv[FGja]	V	2
850+281	851+586	1,305	FGt		1
851+586	851+901	315	FGj		1
851+901	851+964	63	Cv[FGa]	V	2
851+964	852+300	336	Ft		1
852+300	852+353	54	FAp		1
852+353	852+511	157	Ft		1
852+511	852+566	55	Cv[FGa]	R^s	2
852+566	853+285	719	Cb[FGj]		2
853+285	855+387	2,102	FAp		1
855+387	855+429	42	Cv[FGja]	V,R^s	2
855+429	855+667	238	FAp		1
855+667	855+747	81	Cv[FGja]	V,R^s	2
855+747	855+785	38	FAp		1
855+785	855+848	63	Cv[FGja]	V,R^s	2
855+848	856+720	872	FAp		1
856+720	857+057	337	Ev[FGp]		2
857+057	857+144	87	Cv[FGaj]	V	2
857+144	857+213	69	LGb[FGp]		2
857+213	857+252	39	Cv[FGaj]	V	2
857+252	857+510	257	LGb[FGp]		2
857+510	857+889	379	Obv[LGb]	Xt	3

IFAE KM start	IFAE KM finish	Segment Length (m)	Materials[1]	Geoprocess	Terrain Type
857+889	859+685	1,796	LGv[Mb]		2
859+685	860+682	997	Mb	L	1
860+682	862+469	1,786	Mb		1
862+469	862+597	128	Mb	L	1
862+597	862+666	69	Mb		1
862+666	867+998	5,332	Eu/Mb[Ru]		2
867+998	868+075	77	Mb		1
868+075	868+172	97	Eu/Mb[Ru]		2
868+172	869+527	1,355	Mb		1
869+527	871+274	1,747	LGv[Mb]/Ov[LGv]	L	2
871+274	872+030	755	Ft		1
872+030	872+083	54	FAb		1
872+083	872+347	263	Ft		1
872+347	872+473	126	Cv[FGa]	^	2
872+473	873+041	568	LGv[Mp]		2
873+041	873+181	139	Cv[Mb]	V	2
873+181	874+175	995	LGb[Mp]		2
874+175	874+760	585	LGp/Ov[LGp]		2
874+760	874+953	192	Ov[LGp]	Xt	3
874+953	875+182	217	LGp/Ov[LGp]		2
875+182	875+536	330	LGb[Mu]		2
875+536	875+576	38	Ob[LGb]//N		3
875+576	876+498	926	LGb[Mu]		2
876+498	876+801	324	Ov[LGp]		3
876+801	876+914	121	Ov[LGp]	L	3
876+914	876+963	52	Ov[LGp]		3
876+963	878+857	1,896	LGu//Ov[LGp]		2
878+857	878+885	28	Ob[LGp]/N	Xt	3
878+885	879+207	323	LGu//Ov[LGp]		2
879+207	879+311	103	Cv[LGak]	V	2
879+311	879+838	527	LGu/Ov[LGp]		2
879+838	879+887	50	Cv[LGak]	V	2
879+887	880+141	253	LGu/Ov[LGp]		2
880+141	880+179	38	Cv[LGak]	V	2
880+179	880+614	435	LGu/Ov[LGp]		2
880+614	880+683	69	Cv[LGak]	V	2
880+683	882+128	1,444	LGp/Ov[LGp]		2
882+128	882+533	405	Ev[LGp]//Ov[LGp]		2
882+533	882+563	29	LGp	L	2
882+563	883+309	747	Ov[LGp]/Eu		3

IFAE KM start	IFAE KM finish	Segment Length (m)	Materials[1]	Geoprocess	Terrain Type
883+309	883+382	73	Cak[LGas]	V,R^s	2
883+382	884+939	1,557	Ov[LGp]/Eu		3
884+939	885+001	62	Cak[LGas]	V,R^s	2
885+001	886+974	1,973	Eu/Ov[LGp]		2
886+974	888+221	1,247	LGp//Ev[LGp]		2
888+221	888+574	353	FGu		1
888+574	888+624	50	FGd//N	H	1
888+624	889+723	1,099	FGu		1
889+723	890+037	314	FGr		1
890+037	891+594	1,557	FGu		1
891+594	891+658	63	FGak	V	1
891+658	892+414	757	FGu/Ov		1
892+414	892+909	494	FGp		1
892+909	893+360	451	Er		2
893+360	894+158	798	FGp		1
894+158	897+914	3,756	Er		2
897+914	898+240	326	LGp//Ev[LGp]		2
898+240	898+405	165	LGp//Ov[LGp]	L	2
898+405	898+410	5	LGp		2
898+410	899+388	979	Em		2
899+388	899+566	178	LGp		2
899+566	899+792	226	Ev[LGp]		2
899+792	899+803	11	Ob[LGp]/N	Xt	3
899+803	899+995	192	LGp//Ev[LGp]		2
899+995	900+065	70	Eb[LGp]		2
900+065	902+243	2,178	Em		2
902+243	902+730	487	LGp//Ev[LGp]		2
902+730	903+315	584	Eu		2
903+315	903+411	97	Ov[LGp]	L	3
903+411	903+732	321	Evb[LGp]		2
903+732	903+972	240	Eu		2
903+972	904+053	80	Evb[LGp]		2
904+053	904+073	20	Eu		2
904+073	904+298	225	Evb[LGp]		2
904+298	904+578	280	Eu		2
904+578	904+626	47	Evb[LGp]		2
904+626	904+907	281	Eu		2
904+907	905+330	424	Evb[LGp]		2
905+330	905+349	18	Ov[LGp]		3
905+349	906+616	1,267	Evb[LGp]		2

IFAE KM start	IFAE KM finish	Segment Length (m)	Materials[1]	Geoprocess	Terrain Type
906+616	907+268	652	Evb[LGp]/Ov[LGp]		2
907+268	907+388	119	Em		2
907+388	907+498	110	Ev[LGp]/Ov[LGp]		2
907+498	907+534	37	Evb[LGp]		2
907+534	908+870	1,336	Ev[LGp]/Ov[LGp]		2
908+870	909+273	403	Eu//Ov[LGp]		2
909+273	910+185	912	Eu		2
910+185	910+622	437	Ov[LGp]/Eu		3
910+622	910+694	72	Eu		2
910+694	910+829	135	Ov[LGp]/Eu		3
910+829	911+049	220	Ov[LGp]/Evb[LGp]	L	3
911+049	911+191	142	Ov[LGp]/Evb[LGp]		3
911+191	911+387	196	Ov[LGp]/Evb[LGp]	L	3
911+387	911+480	93	Eu/Ov[LGp]		2
911+480	911+529	49	Cvb[LGaj]	V	2
911+529	912+009	480	Ov[LGp]/Eu		3
912+009	912+169	160	Cvb[LGaj]	V	2
912+169	912+339	170	Ov[LGp]/Eu		3
912+339	912+408	69	Cvb[LGaj]	V	2
912+408	912+495	87	Ov[LGp]/Eu		3
912+495	912+711	216	Cvb[LGaj]	V	2
912+711	912+725	14	FAp		1
912+725	912+885	160	Cvb[LGja]	V	2
912+885	912+953	68	LGpu/Ov[LGp]		2
912+953	912+980	27	Cvb[LGja]	V	2
912+980	916+907	3,926	LGpu/Ov[LGp]		2
916+907	917+633	726	LGu		2
917+633	919+018	1,385	LGpu/Ov[LGp]		2
919+018	919+072	54	FAp/Ov[LGp]		1
919+072	919+171	99	Ov[LGp]//LGp		3
919+171	919+214	43	Ov[LGp]	L	3
919+214	919+743	529	Ov[LGp]/LGp		3
919+743	921+627	1,884	Ov[LGp]//LGp	L	3
921+627	921+993	366	Cv[LGaj]	V,R^u	2
921+993	922+003	11	FAp		1
922+003	922+222	219	Cv[LGaj]	V,R^u	2
922+222	922+444	222	LGpu//Ov[LGp]	L	2
922+444	922+519	74	Eu		2
922+519	922+996	477	LGpu//Ov[LGp]	L	2
922+996	923+738	742	LGpu//Ov[LGp]		2

IFAE KM start	IFAE KM finish	Segment Length (m)	Materials[1]	Geoprocess	Terrain Type
923+738	926+044	2,306	LGpu//Ov[LGp]	L	2
926+044	928+225	2,181	Ovb[LGp]	L	3
928+225	928+946	721	LGp		2
928+946	929+579	633	LGp//Ov[LGp]	L	2
929+579	929+729	150	LGp		2
929+729	929+811	82	LGp//Ov[LGp]	L	2
929+811	930+350	539	LGp		2
930+350	930+571	221	LGp//Ov[LGp]	L	2
930+571	930+690	119	LGp		2
930+690	930+882	193	LGp//Ov[LGp]	L	2
930+882	931+781	236	LGp		2
931+781	933+752	300	LGu		2
933+752	934+318	86	Cv[LGjk]	V,X^f	2
934+318	934+389	11	FAp		1
934+389	935+552	177	Mj		1
935+552	935+774	34	Mjp	L	1
935+774	938+148	361	Mju		1
938+148	938+398	38	Mjp	L	1
938+398	940+153	397	Mju		1
940+153	940+335	182	Cv[Maj]//Fp	V	2
940+335	940+942	606	Mj		1
940+942	940+990	48	Mj	V	1
940+990	941+052	63	Mj		1
941+052	941+195	142	Mj	V	1
941+195	941+530	336	Mj		1
941+530	941+555	24	Mj	L	1
941+555	941+995	440	Mj		1
941+995	942+022	27	Mj	L	1
942+022	942+531	509	Mj		1
942+531	942+553	22	Mj	L	1
942+553	942+760	206	Mj		1
942+760	942+783	23	Mj	L	1
942+783	943+413	630	Mj		1
943+413	945+925	2,512	Mp//Ov[Mp]		2
945+925	946+830	905	Mj		1
946+830	947+915	1,085	Mpj/Ov[Mpj]	L	2
947+915	948+143	228	Mv[Rr]		1
948+143	948+164	22	Mbv	L	1
948+164	948+430	266	Mbv[Ruh]		1
948+430	948+712	282	Mbv	L	1

IFAE KM start	IFAE KM finish	Segment Length (m)	Materials[1]	Geoprocess	Terrain Type
948+712	949+085	373	Mbv[Ruh]		1
949+085	950+153	1,068	Mvb[Ruh]//Rh		1
950+153	950+451	298	Mb[Ruh]		1
950+451	950+526	75	Mp	L	1
950+526	951+980	1,453	Mm		1
951+980	952+191	211	Mp//Ov[Mp]	L	2
952+191	952+347	156	Mj		1
952+347	952+363	16	FGh[Mm]		1
952+363	952+506	143	Mj		1
952+506	952+507	1	Mm		1
952+507	952+571	64	FGh[Mm]		1
952+571	952+898	327	Mm		1
952+898	953+108	211	Mj		1
953+108	953+340	231	Mm		1
953+340	953+389	49	FAp		1
953+389	953+458	69	Mu		1
953+458	953+614	156	Mp		1
953+614	953+704	90	Mbv[Ru]		1
953+704	954+435	731	Mp		1
954+435	957+072	2,637	Mj		1
957+072	958+236	1,164	Mp		1
958+236	958+464	228	Mu		1
958+464	958+996	532	Mp		1
958+996	959+143	146	Mb	L	1
959+143	959+322	179	Mb		1
959+322	959+854	533	Mb	L	1
959+854	959+961	107	Mb		1
959+961	962+081	2,120	Mb	L	1
962+081	962+104	23	Mv[Ru]		1
962+104	966+839	4,735	Mb	L	1
966+839	967+178	339	LGv[Mp]		2
967+178	967+288	109	Ov[LGv]	L	3
967+288	967+677	389	LGv[Mp]		2
967+677	967+790	113	Mj/Cv[Mj]	V	1
967+790	967+949	159	FAp[Fp]		1
967+949	968+119	170	Mj/Cv[Mj]	V	1
968+119	968+258	139	LGv[Mp]		2
968+258	968+338	80	LGv[Mp]	L	2
968+338	968+791	452	LGb[Mp]/Ov[LGb]		2
968+791	969+428	637	LGv[Mp]		2

IFAE KM start	IFAE KM finish	Segment Length (m)	Materials[1]	Geoprocess	Terrain Type
969+428	969+635	207	Mb		1
969+635	969+714	79	LGv[Mb]		2
969+714	970+138	424	Mb		1
970+138	970+763	625	Mp		1
970+763	971+049	286	Ov[Mp]	L	3
971+049	971+452	403	LGv[Mb]		2
971+452	971+466	14	FAp/Cv[Mb]	V	1
971+466	971+467	1	Ov[Mp]	L	3
971+467	971+492	25	FAp/Cv[Mb]	V	1
971+492	971+751	258	LGv[Mb]	L	2
971+751	972+849	1,098	LGv[Mb]		2
972+849	972+903	55	FAp/Cv[Mb]	V	1
972+903	973+308	405	LGv[Mb]		2
973+308	973+353	45	Cv	R^s	2
973+353	973+569	216	FAp		1
973+569	973+655	86	Cv[Mb]		2
973+655	973+687	32	Ft		1
973+687	973+789	102	Cv[Mb]		2
973+789	974+329	540	LGb[Mp]		2
974+329	974+429	100	LGb[Mp]	L	2
974+429	977+098	2,669	Mp		1
977+098	977+312	214	FGr/Mp		1
977+312	977+544	232	Mp		1
977+544	977+942	398	FGr/Mp		1
977+942	978+208	266	Mp		1
978+208	978+750	542	FGr/Mp		1
978+750	981+362	2,613	Mp		1
981+362	983+091	1,729	Mp	L	1
983+091	983+426	335	Mp		1
983+426	983+501	75	Mju//Cv[Mj]	V	1
983+501	983+548	47	Mp	L	1
983+548	983+615	67	Mju//Cv[Mj]	V	1
983+615	983+670	56	Mp	L	1
983+670	983+775	105	Mju//Cv[Mj]	V	1
983+775	983+786	11	Mp		1
983+786	983+995	209	Mju//Cv[Mj]	V	1
983+995	984+125	130	Mp		1