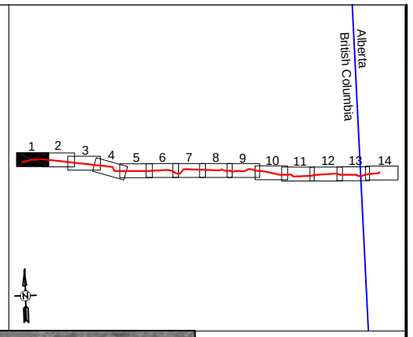
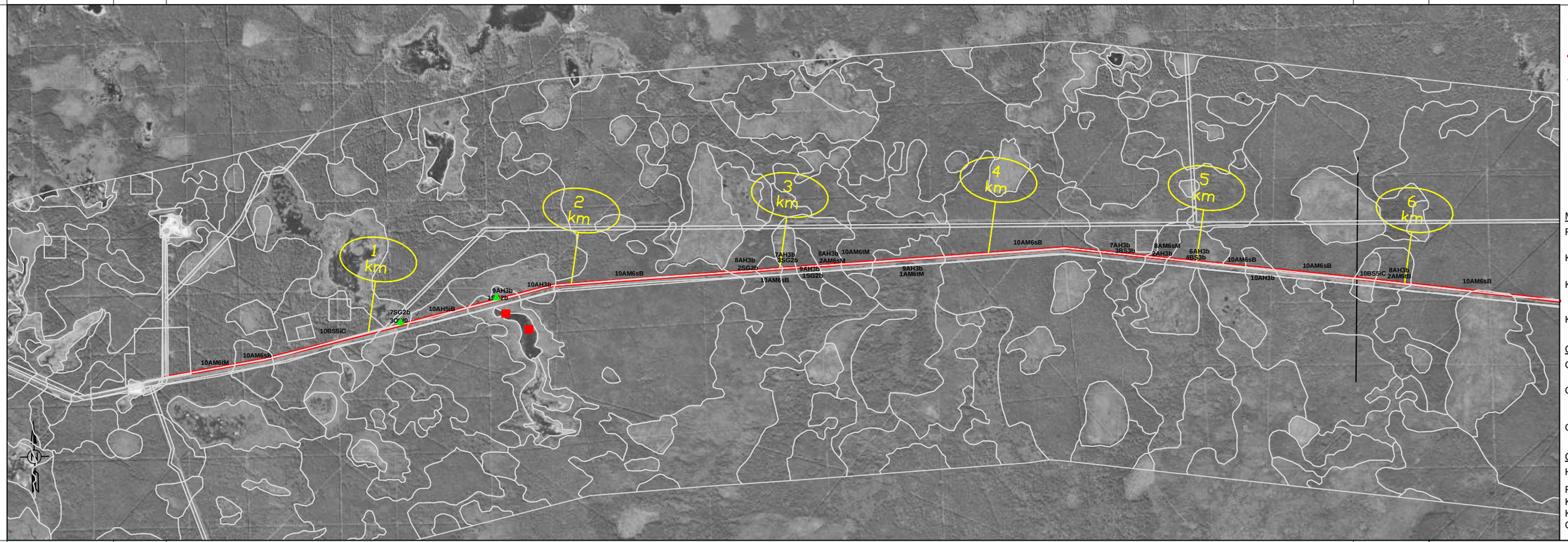
Appendix 13A Environmental Alignment Sheets

BIOPHYSICAL CONDITIONS		
SOILS / TERRAIN	Kmg, Opg, Kmg, Opg, Kmg, Opg, Kmg, Opg, Kmg, Opg, Kmg, Opg, Kmg	
POTENTIAL PERMAFROST		
VEGETATION / RARE PLANTS	Vegetation Survey Site; Vegetation Survey Site	
WILDLIFE RESOURCES	Active Beaver Lodge; Potential Trumpeter Swan Habitat	
ARCHAEOLOGICAL		
FISHERIES RESOURCES		





- Kp Marker
- EnCana Proposed Pipeline Route
- Matchline
- Proposed Vegetation Survey Site
- Proposed Wildlife Survey Site
- Vegetation Communities

TERRAIN MAP UNITS

Mineral

Fmg - moderately well drained fluvial material

Kig - imperfectly drained glaciolacustrine material

Kigp - imperfectly drained glaciolacustrine material with potential permafrost

Kmg - moderately well drained glaciolacustrine material

Organic

Opg - poorly drained organic material

Opgp - poorly drained organic material with potential permafrost

Ovg - very poorly drained organic material

Other

Hhg - Waterbodies

Fmga, Kiga, Kmga, Opga — terrain disturbed through anthropogenic means

ENVIRONMENTAL PROTECTION MEASURES	
SOIL HANDLING	
WATER CROSSINGS	
RECLAMATION	Seed mineral soils with approved seed mix (Fmg, Kig, Kigp, Kmg)
SITE SPECIFIC MEASURES	
TIMING CONSTRAINTS	
ARCHAEOLOGICAL MITIGATION	

PREPARED FOR: ENCANA

PREPARED BY: AXYS Environmental Consulting Ltd

EnCana Proposed Ekwan Pipeline Route
Alignment Sheets

DATE:	SCALE:	SHEET	PROJECT NO.
28/02/03	1:20,000	1 of 14	POG1045

REVISIONS

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ENVIRONMENTAL NOTES

Note 1: HDD is preferred crossing technique; otherwise isolated open cut (dam & pump or flume)

Note 2: Dam and pump or flume isolation if flowing; otherwise open cut if dry or frozen

Note 3: 200m of rollback

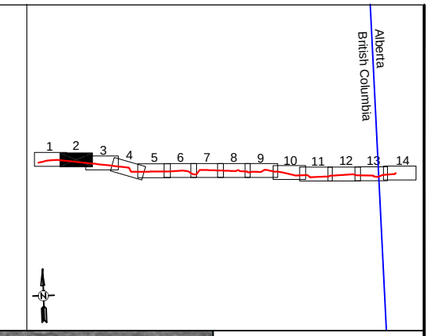
Note 4: 100 - 150m of rollback

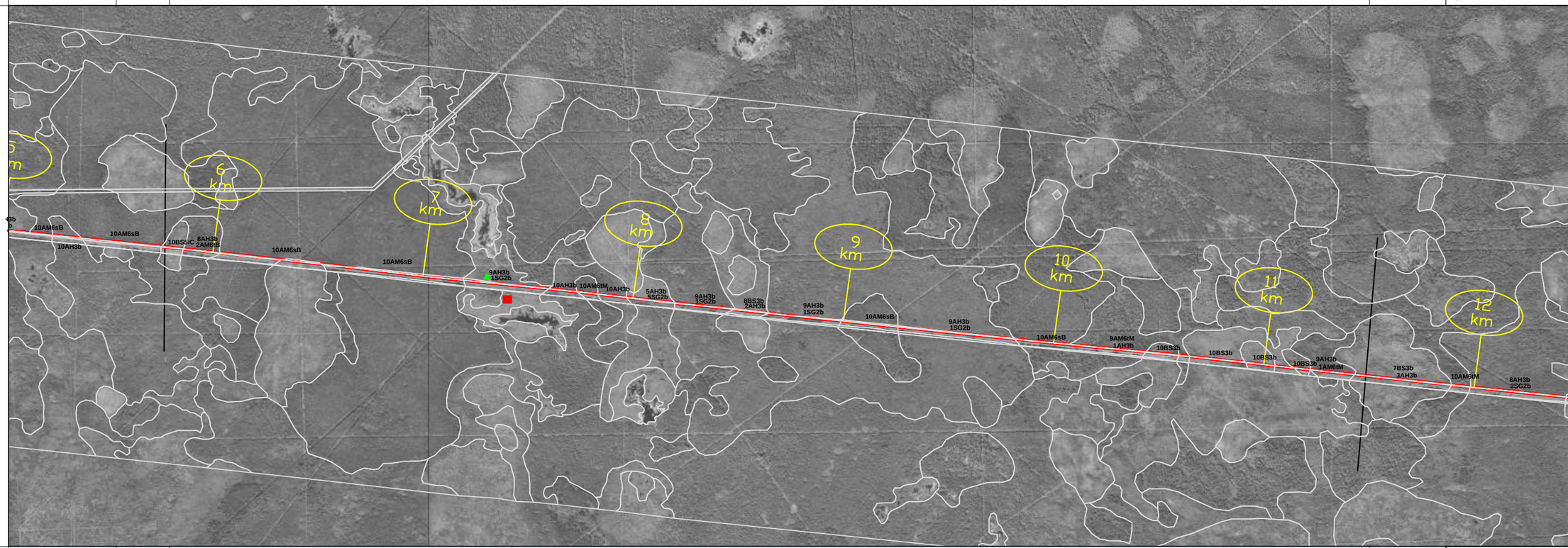
Note 5: For areas of permafrost that, after construction, may impact the environment or the pipeline integrity implement measures outlined in the EPP (Appendix 13D.16)

Note 6: If isolated open cut, channel & bank restoration measures to be applied as appropriate (Appendix 13D.B.4.4)

BIOPHYSICAL CONDITIONS

SOILS / TERRAIN	Opg, Kmg, Opg, Kmg, Opg, Ovg, Opg, Kmg, Opg, Kmg, Opg, Kmg, Opg
POTENTIAL PERMAFROST	Some thaw ponds along north side of existing RoW; Thaw ponds visible not in thick Muskeg; Speckled bog, with some thaw ponds
VEGETATION / RARE PLANTS	Vegetation Survey Site
WILDLIFE RESOURCES	Active Beaver Lodge
ARCHAEOLOGICAL	
FISHERIES RESOURCES	





- Kp Marker
- EnCana Proposed Pipeline Route
- Matchline
- Proposed Vegetation Survey Site
- Proposed Wildlife Survey Site
- Vegetation Communities

TERRAIN MAP UNITS

Mineral

- Fmg - moderately well drained fluvial material
- Kig - imperfectly drained glaciolacustrine material
- Kigp - imperfectly drained glaciolacustrine material with potential permafrost
- Kmg - moderately well drained glaciolacustrine material

Organic

- Opg - poorly drained organic material
- Opgp - poorly drained organic material with potential permafrost
- Ovg - very poorly drained organic material

Other

- Hhg - Waterbodies
- Fmga, Kiga, Kmga, Opga - terrain disturbed through anthropogenic means

ENVIRONMENTAL PROTECTION MEASURES

SOIL HANDLING	
WATER CROSSINGS	
RECLAMATION	Seed mineral soils with approved seed mix (Fmg, Kig, Kigp, Kmg)
SITE SPECIFIC MEASURES	
TIMING CONSTRAINTS	
ARCHAEOLOGICAL MITIGATION	

ENVIRONMENTAL NOTES

Note 1: HDD is preferred crossing technique; otherwise isolated open cut (dam & pump or flume)

Note 2: Dam and pump or flume isolation if flowing; otherwise open cut if dry or frozen

Note 3: 200m of rollback

Note 4: 100 - 150m of rollback

Note 5: For areas of permafrost that, after construction, may impact the environment or the pipeline integrity, implement measures outlined in the EPP (Appendix 13D.16)

Note 6: If isolated open cut, channel & bank restoration measures to be applied as appropriate (Appendix 13D.B.4.4)

PREPARED FOR: ENCANA

PREPARED BY: AXYS Environmental Consulting Ltd

EnCana Proposed Ekwan Pipeline Route
Alignment Sheets

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REVISIONS

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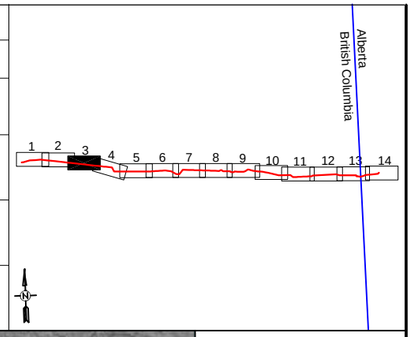
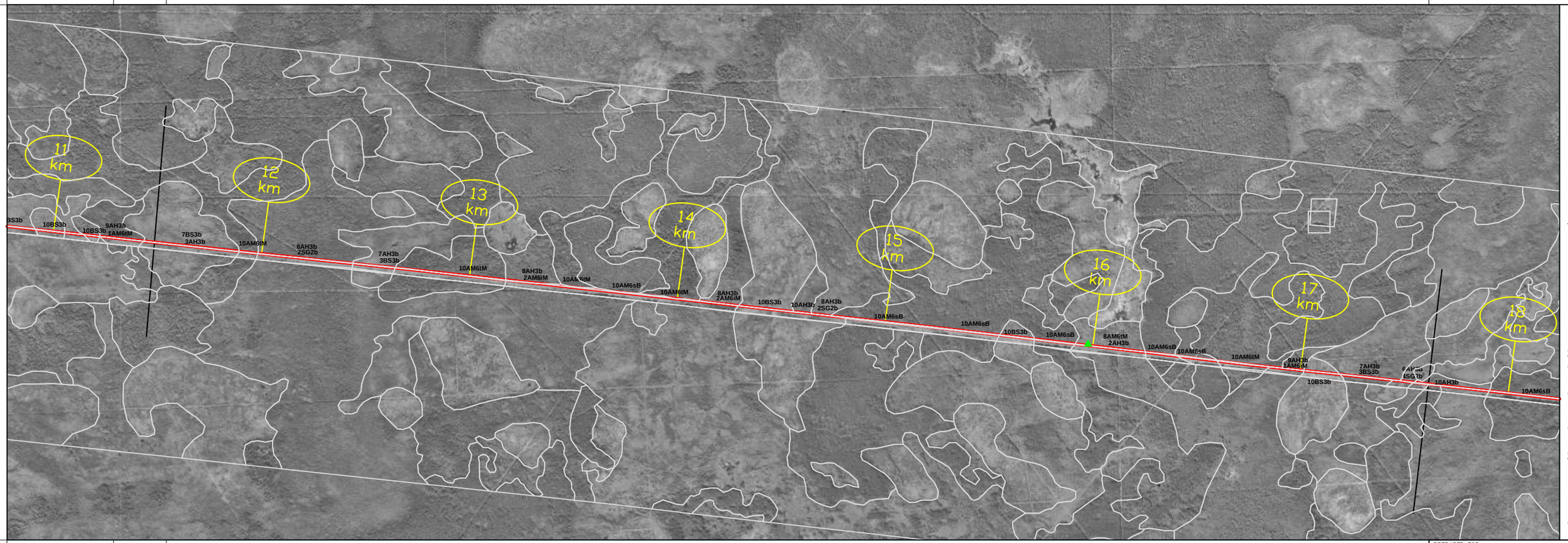
BIOPHYSICAL CONDITIONS

SOILS / TERRAIN	Opg	Kmg	Opg	Kmg	Opg	Kmg	Opg	Kmg	Opg	Kmg	Opg
POTENTIAL PERMAFROST	Speckled bog with some thaw ponds										Speckled bog with some thaw ponds
VEGETATION / RARE PLANTS										Vegetation Survey Site	
WILDLIFE RESOURCES											
ARCHAEOLOGICAL											
FISHERIES RESOURCES											





Kp Marker

EnCana Proposed Pipeline Route

Matchline

Proposed Vegetation Survey Site

Proposed Wildlife Survey Site

Vegetation Communities

TERRAIN MAP UNITS

Mineral

Fmg - moderately well drained fluvial material

Kig - imperfectly drained glaciolacustrine material

Kigp - imperfectly drained glaciolacustrine material with potential permafrost

Kmg - moderately well drained glaciolacustrine material

Organic

Opg - poorly drained organic material

Opgp - poorly drained organic material with potential permafrost

Ovg - very poorly drained organic material

Other

Hhg - Waterbodies

Fmga, Kiga, Kmga, Opga - terrain disturbed through anthropogenic means

ENVIRONMENTAL PROTECTION MEASURES

SOIL HANDLING	
WATER CROSSINGS	
RECLAMATION	Seed mineral soils with approved seed mix (Fmg, Kig, Kigp, Kmg)
SITE SPECIFIC MEASURES	
TIMING CONSTRAINTS	
ARCHAEOLOGICAL MITIGATION	

ENVIRONMENTAL NOTES

Note 1: HDD is preferred crossing technique; otherwise isolated open cut (dam & pump or flume)

Note 2: Dam and pump or flume isolation if flowing; otherwise open cut if dry or frozen

Note 3: 200m of rollback

Note 4: 100 - 150m of rollback

Note 5: For areas of permafrost that, after construction, may impact the environment or the pipeline integrity, implement measures outlined in the EPP (Appendix 13D.16)

Note 6: If isolated open cut, channel & bank restoration measures to be applied as appropriate (Appendix 13D.B.4.4)

PREPARED FOR:

ENCANA

PREPARED BY:

AXYS Environmental Consulting Ltd

EnCana Proposed Ekwan Pipeline Route
Alignment Sheets

DATE:	SCALE:	SHEET	PROJECT NO.
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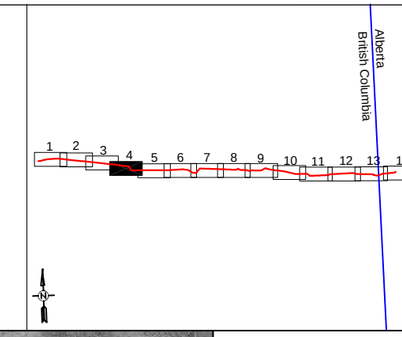
BIOPHYSICAL CONDITIONS

SOILS / TERRAIN	Opg, Kmg, Opg, Kmg, Opg, Kmg, Opg, Kmg, Fmg, Kmg, Opg, Opgp, Kmg, Opgp, Kmg, Opgp
POTENTIAL PERMAFROST	Speckled bog with some thaw ponds; Speckled bog with some thaw ponds
VEGETATION / RARE PLANTS	Vegetation Survey Site
WILDLIFE RESOURCES	Potential Trumperter Swan Habitat
ARCHAEOLOGICAL	
FISHERIES RESOURCES	Kyklo Creek - KP20.9 Low Habitat Value



Kp Marker
EnCana Proposed Pipeline Route
Matchline
Proposed Vegetation Survey Site
Proposed Wildlife Survey Site
Vegetation Communities

TERRAIN MAP UNITS

Mineral

Fmg - moderately well drained fluvial material
Kig - imperfectly drained glaciolacustrine material
Kigp - imperfectly drained glaciolacustrine material with potential permafrost
Kmg - moderately well drained glaciolacustrine material

Organic

Opg - poorly drained organic material
Opgp - poorly drained organic material with potential permafrost
Ovg - very poorly drained organic material

Other

Hhg - Waterbodies
Fmga, Kiga, Kmga, Opga - terrain disturbed through anthropogenic means

ENVIRONMENTAL PROTECTION MEASURES

SOIL HANDLING	
WATER CROSSINGS	Note 1
RECLAMATION	Seed mineral soils with approved seed mix (Fmg, Kig, Kigp, Kmg); Note 3; southeast from existing pipeline; Note 4; north from intersection with seismic line; Note 6; Note 7; Note 4; in first closed forest stand on either side of seismic/winter road access; Install gate during construction for control of unauthorized traffic
SITE SPECIFIC MEASURES	
TIMING CONSTRAINTS	Fisheries April -Dec
ARCHAEOLOGICAL MITIGATION	

PREPARED FOR: ENCANA

PREPARED BY: AXYS Environmental Consulting Ltd

EnCana Proposed Ekwan Pipeline Route Alignment Sheets

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REVISIONS

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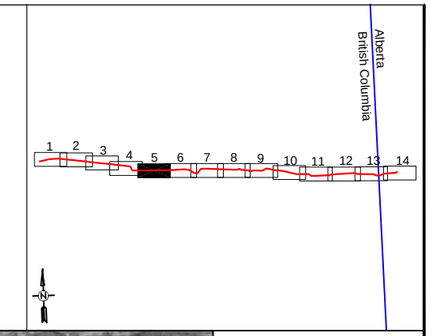
1	28/02/03				

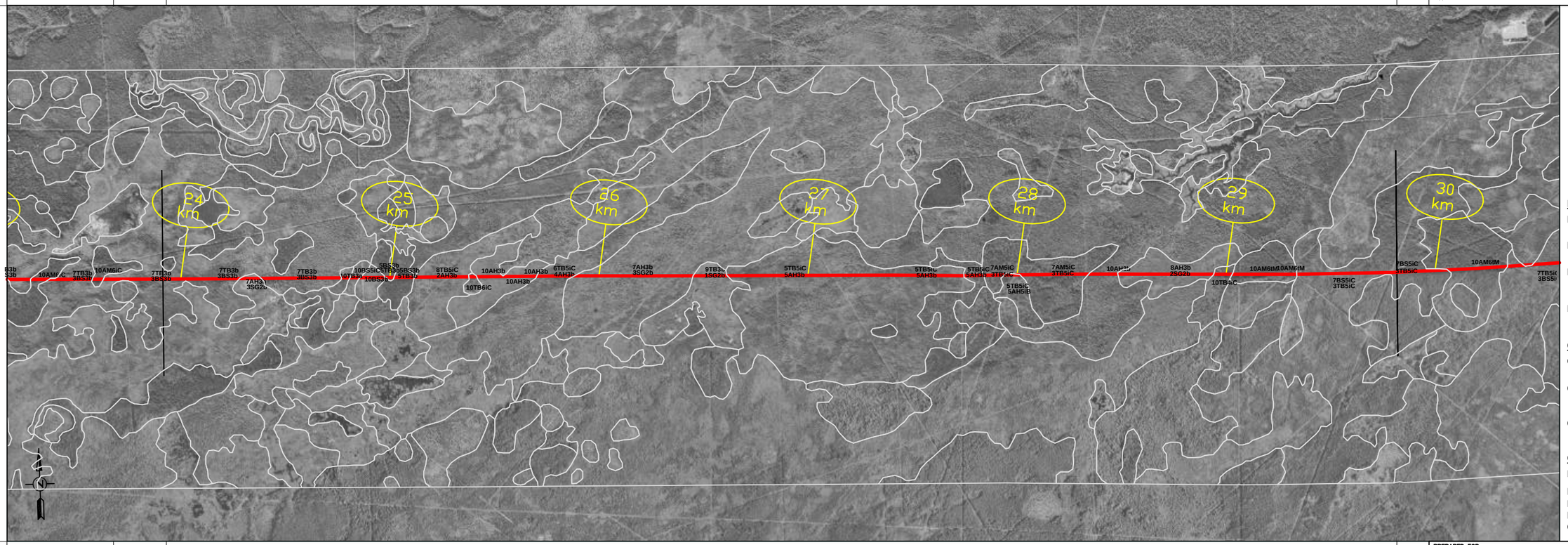
ENVIRONMENTAL NOTES

Note 1: HDD is preferred crossing technique; otherwise isolated open cut (dam & pump or flume)
Note 2: Dam and pump or flume isolation if flowing; otherwise open cut if dry or frozen
Note 3: 200m of rollback
Note 4: 100 - 150m of rollback
Note 5: For areas of permafrost that, after construction, may impact the environment or the pipeline integrity, implement measures outlined in the EPP (Appendix 13D.16)
Note 6: If isolated open cut, channel & bank restoration measures to be applied as appropriate (Appendix 13D.B.4.4)
Note 7: 100% rollback on access trails developed for stream crossings

BIOPHYSICAL CONDITIONS

SOILS / TERRAIN	Opgp	Opg	Opgp	Opg	Kig	Opg	Kig	Opg	Kig / Opgp	Kmg	Opg	Opgp	Kmg	Opg
POTENTIAL PERMAFROST								Speckled bog with some thaw ponds						Speckled bog with some thaw ponds
VEGETATION / RARE PLANTS														
WILDLIFE RESOURCES			Potential Trumpeter Swan Habitat											
ARCHAEOLOGICAL														
FISHERIES RESOURCES														





Kp Marker

EnCana Proposed Pipeline Route

Matchline

Proposed Vegetation Survey Site

Proposed Wildlife Survey Site

Vegetation Communities

TERRAIN MAP UNITS

Mineral

Fmg - moderately well drained fluvial material

Kig - imperfectly drained glaciolacustrine material

Kigp - imperfectly drained glaciolacustrine material with potential permafrost

Kmg - moderately well drained glaciolacustrine material

Organic

Opg - poorly drained organic material

Opgp - poorly drained organic material with potential permafrost

Ovg - very poorly drained organic material

Other

Hhg - Waterbodies

Fmga, Kiga, Kmga, Opga - terrain disturbed through anthropogenic means

ENVIRONMENTAL PROTECTION MEASURES

SOIL HANDLING	
WATER CROSSINGS	
RECLAMATION	Seed mineral soils with approved seed mix (Fmg, Kig, Kigp, Kmg)
SITE SPECIFIC MEASURES	
TIMING CONSTRAINTS	
ARCHAEOLOGICAL MITIGATION	

PREPARED FOR: ENCANA

PREPARED BY: AXYS Environmental Consulting Ltd

EnCana Proposed Ekwan Pipeline Route
Alignment Sheets

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REVISIONS

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1	28/02/03				

ENVIRONMENTAL NOTES

Note 1: HDD is preferred crossing technique; otherwise isolated open cut (dam & pump or flume)

Note 2: Dam and pump or flume isolation if flowing; otherwise open cut if dry or frozen

Note 3: 200m of rollback

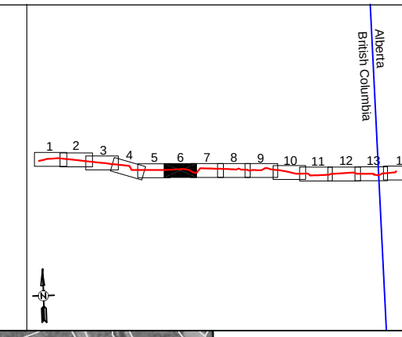
Note 4: 100 - 150m of rollback

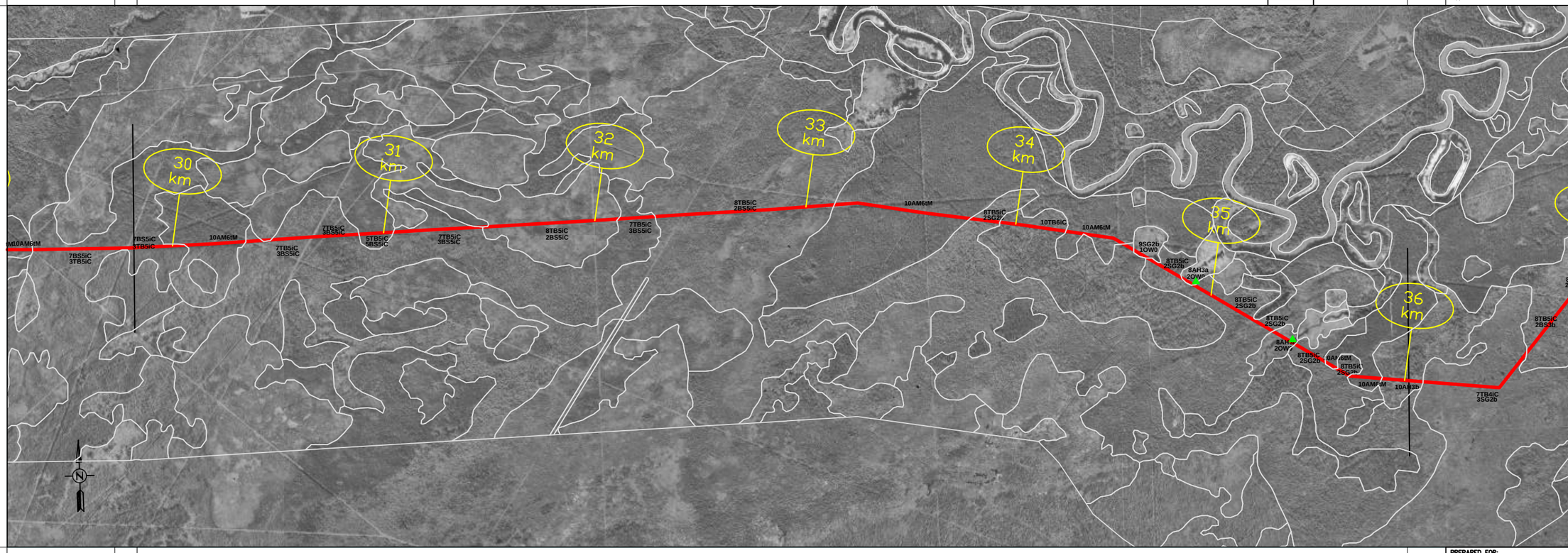
Note 5: For areas of permafrost that, after construction, may impact the environment or the pipeline integrity, implement measures outlined in the EPP (Appendix 13D.16)

Note 6: If isolated open cut, channel & bank restoration measures to be applied as appropriate (Appendix 13D.B.4.4)

BIOPHYSICAL CONDITIONS

SOILS / TERRAIN	Opg; Kmg; Kig; Kmg; Kig; Kmg; Kig; Opg; Kig; Kmg; Opg
POTENTIAL PERMAFROST	
VEGETATION / RARE PLANTS	Vegetation Survey Site; Vegetation Survey Site
WILDLIFE RESOURCES	
ARCHAEOLOGICAL	
FISHERIES RESOURCES	Tributary to Kyklo Creek KP35.4 Low to negligible habitat value





Kp Marker
EnCana Proposed Pipeline Route
Matchline
Proposed Vegetation Survey Site
Proposed Wildlife Survey Site
Vegetation Communities

TERRAIN MAP UNITS

Mineral

Fmg - moderately well drained fluvial material
Kig - imperfectly drained glaciolacustrine material
Kigp - imperfectly drained glaciolacustrine material with potential permafrost
Kmg - moderately well drained glaciolacustrine material

Organic

Opg - poorly drained organic material
Opgp - poorly drained organic material with potential permafrost
Ovg - very poorly drained organic material

Other

Hhg - Waterbodies
Fmga, Kiga, Kmga, Opga - terrain disturbed through anthropogenic means

ENVIRONMENTAL PROTECTION MEASURES

SOIL HANDLING	
WATER CROSSINGS	Note 2
RECLAMATION	Seed mineral soils with approved seed mix (Fmg, Kig, Kigp, Kmg); Note 3; southeast from seismic/road intersection; Note 3; west from seismic line intersection
SITE SPECIFIC MEASURES	
TIMING CONSTRAINTS	Fisheries April -Dec
ARCHAEOLOGICAL MITIGATION	

PREPARED FOR: ENCANA

PREPARED BY: AXYS Environmental Consulting Ltd

EnCana Proposed Ekwan Pipeline Route Alignment Sheets

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REVISIONS

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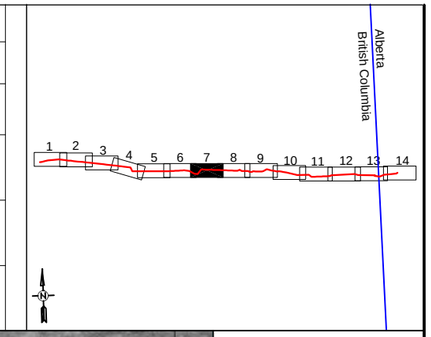
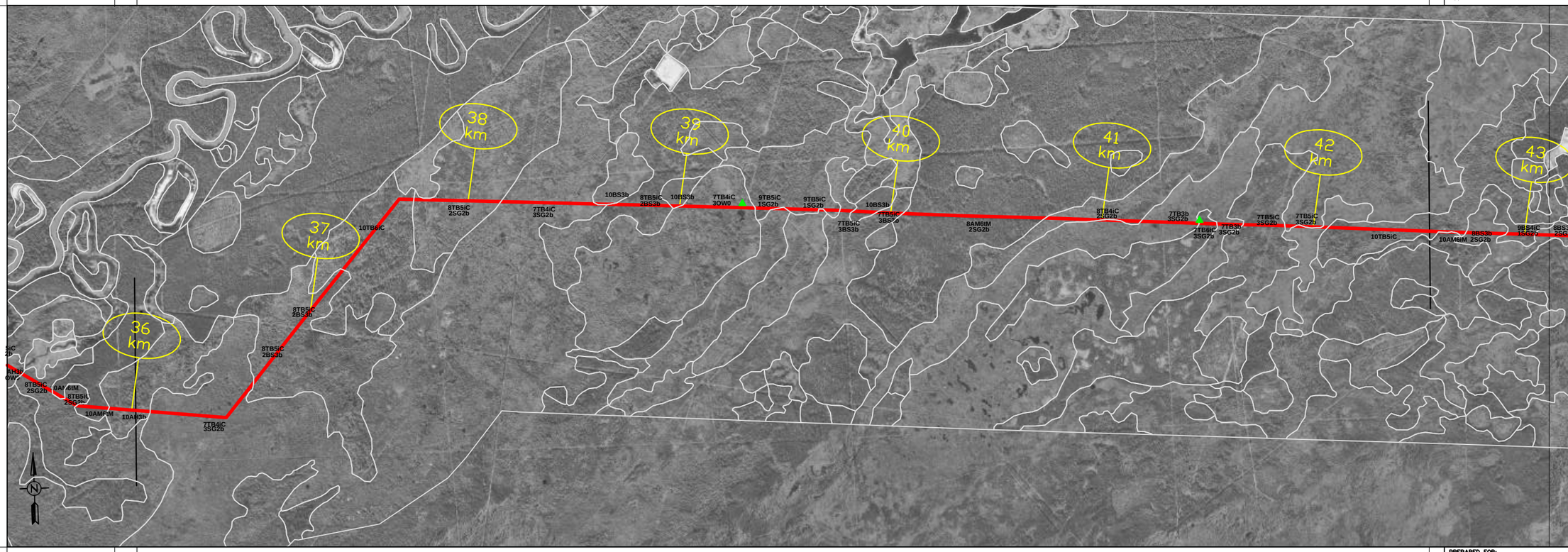
ENVIRONMENTAL NOTES

Note 1: HDD is preferred crossing technique; otherwise isolated open cut (dam & pump or flume)
Note 2: Dam and pump or flume isolation if flowing; otherwise open cut if dry or frozen
Note 3: 200m of rollback
Note 4: 100 - 150m of rollback
Note 5: For areas of permafrost that, after construction, may impact the environment or the pipeline integrity, implement measures outlined in the EPP (Appendix 13D.16)
Note 6: If isolated open cut, channel & bank restoration measures to be applied as appropriate (Appendix 13D.B.4.4)

BIOPHYSICAL CONDITIONS

SOILS / TERRAIN	Opg, Kig, Opg, Kig, Opg, Kig, Opg, Kig, Kmg, Opg, Kig, Opg, Kig, Opg, Kig
POTENTIAL PERMAFROST	speckled bog, no thaw ponds visible on air photos; speckled bog, no thaw ponds visible on air photos; speckled bog, no thaw ponds visible on air photos
VEGETATION / RARE PLANTS	Vegetation Survey Site; Vegetation Survey Site
WILDLIFE RESOURCES	
ARCHAEOLOGICAL	
FISHERIES RESOURCES	





Kp Marker

EnCana Proposed Pipeline Route

Matchline

Proposed Vegetation Survey Site

Proposed Wildlife Survey Site

Vegetation Communities

TERRAIN MAP UNITS

Mineral

Fmg - moderately well drained fluvial material

Kig - imperfectly drained glaciolacustrine material

Kigp - imperfectly drained glaciolacustrine material

Kmg - moderately well drained glaciolacustrine material

Organic

Opg - poorly drained organic material

Opgp - poorly drained organic material with potential permafrost

Ovg - very poorly drained organic material

Other

Hhg - Waterbodies

Fmga, Kiga, Kmga, Opga - terrain disturbed through anthropogenic means

ENVIRONMENTAL PROTECTION MEASURES

SOIL HANDLING	
WATER CROSSINGS	
RECLAMATION	Seed mineral soils with approved seed mix (Fmg, Kig, Kigp, Kmg)
SITE SPECIFIC MEASURES	
TIMING CONSTRAINTS	
ARCHAEOLOGICAL MITIGATION	

PREPARED FOR: ENCANA

PREPARED BY: AXYS Environmental Consulting Ltd

EnCana Proposed Ekwan Pipeline Route
Alignment Sheets

DATE:	SCALE:	SHEET	PROJECT NO.
28/02/03	1:20,000	7 of 14	POG1045

REVISIONS

No.	DATE	DESCRIPTION	No.	DATE	DESCRIPTION
1	28/02/03				

ENVIRONMENTAL NOTES

Note 1: HDD is preferred crossing technique; otherwise isolated open cut (dam & pump or flume)

Note 2: Dam and pump or flume isolation if flowing; otherwise open cut if dry or frozen

Note 3: 200m of rollback

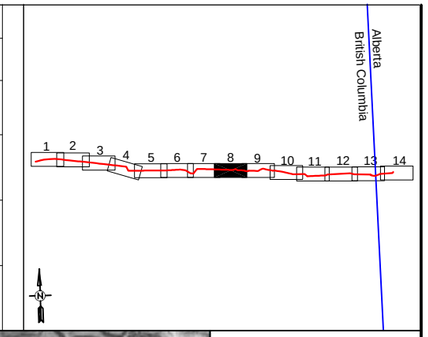
Note 4: 100 - 150m of rollback

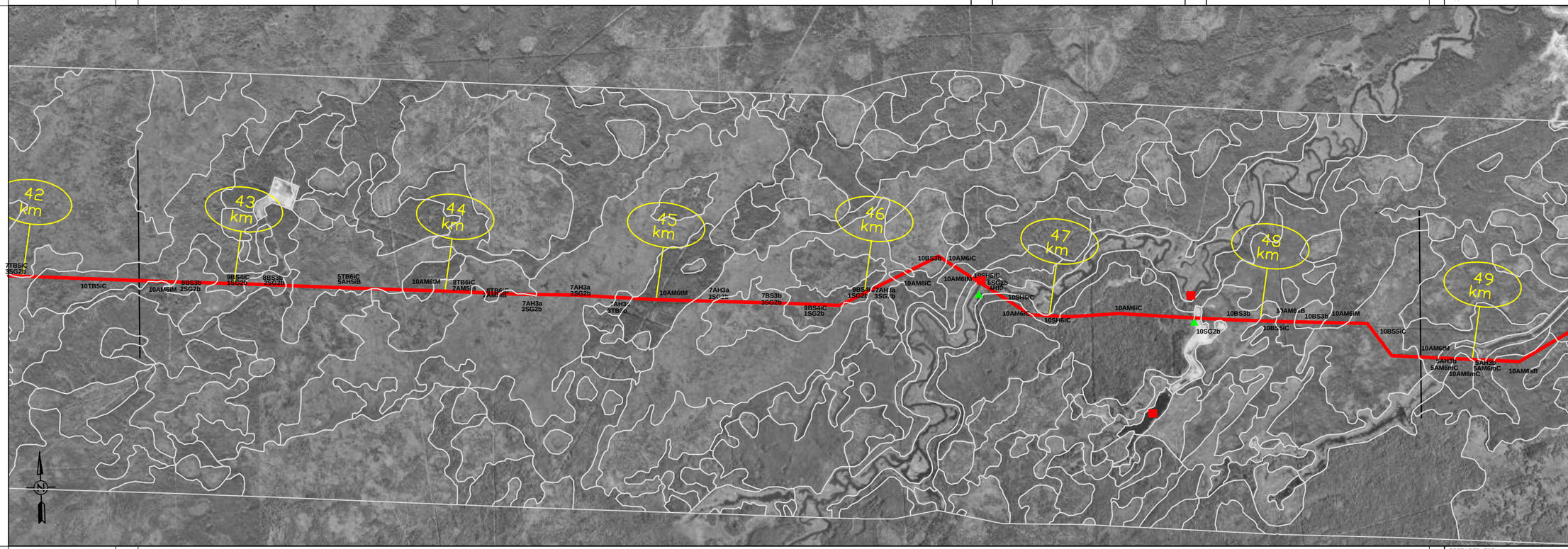
Note 5: For areas of permafrost that, after construction, may impact the environment or the pipeline integrity, implement measures outlined in the EPP (Appendix 13D.16)

Note 6: If isolated open cut, channel & bank restoration measures to be applied as appropriate (Appendix 13D.B.4.4)

BIOPHYSICAL CONDITIONS

SOILS / TERRAIN	Kig; Opg; Kig / Kmg; Opg; Kmg; Opg; Kmg; Opg; Kmg; Fmg; Opg; Fmg; Kmg; Opg; Kmg; Opg
POTENTIAL PERMAFROST	Degrading permafrost, with thaw ponds; Speckled bog, some thaw ponds
VEGETATION / RARE PLANTS	Vegetation Survey Site; Vegetation Survey Site
WILDLIFE RESOURCES	Active Beaver Lodge; Potential Trumpeter Swan Habitat; Active Beaver Lodge
ARCHAEOLOGICAL	
FISHERIES RESOURCES	Townsoitoi Creek KP 46.6 Low habitat value; Tributary to Townsoitoi Creek KP 47.7 Low to negligible habitat





Kp Marker
EnCana Proposed Pipeline Route
Matchline
Proposed Vegetation Survey Site
Proposed Wildlife Survey Site
Vegetation Communities

TERRAIN MAP UNITS

Mineral

Fmg - moderately well drained fluvial material
Kig - imperfectly drained glaciolacustrine material
Kigp - imperfectly drained glaciolacustrine material with potential permafrost
Kmg - moderately well drained glaciolacustrine material

Organic

Opg - poorly drained organic material
Opgp - poorly drained organic material with potential permafrost
Ovg - very poorly drained organic material

Other

Hhg - Waterbodies
Fmga, Kiga, Kmga, Opga - terrain disturbed through anthropogenic means

ENVIRONMENTAL PROTECTION MEASURES

SOIL HANDLING	
WATER CROSSINGS	Note 1; Note 2
RECLAMATION	Seed mineral soils with approved seed mix (Fmg, Kig, Kigp, Kmg); Note 3: Northwest from HDD entry/exit point; Note 6; Note 7; Note 4: either side of seismic line; Note 6
SITE SPECIFIC MEASURES	
TIMING CONSTRAINTS	Fisheries April - Dec.; Fisheries April - Dec.
ARCHAEOLOGICAL MITIGATION	

PREPARED FOR: ENCANA

PREPARED BY: AXYS Environmental Consulting Ltd

EnCana Proposed Ekwan Pipeline Route Alignment Sheets

DATE:	SCALE:	SHEET	PROJECT NO.
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REVISIONS

No.	DATE	DESCRIPTION	No.	DATE	DESCRIPTION
1	28/02/03				

ENVIRONMENTAL NOTES

Note 1: HDD is preferred crossing technique; otherwise isolated open cut (dam & pump or flume)
Note 2: Dam and pump or flume isolation if flowing; otherwise open cut if dry or frozen
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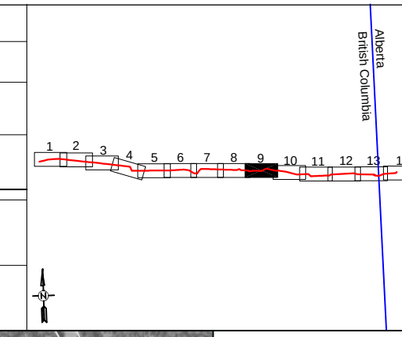
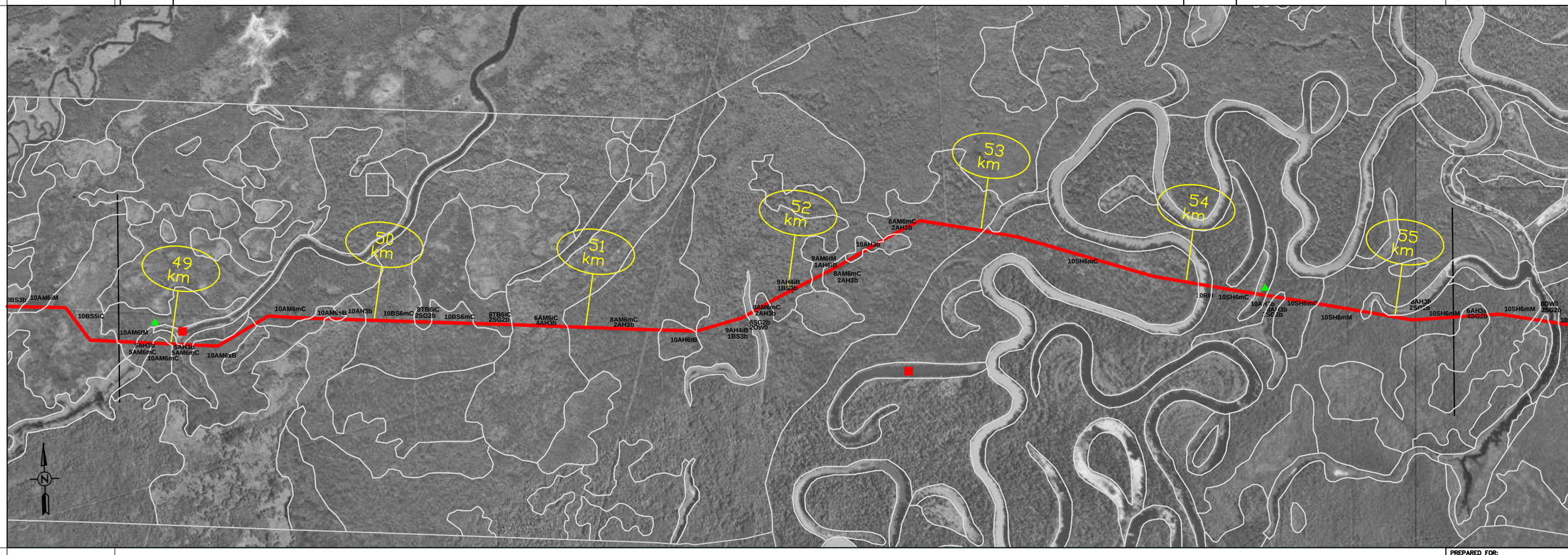
Note 4: 100 - 150m of rollback
Note 5: For areas of permafrost that, after construction, may impact the environment or the pipeline integrity, implement measures outlined in the EPP (Appendix 13D.16)
Note 6: If isolated open cut, channel & bank restoration measures to be applied as appropriate (Appendix 13D.B.4.4)
Note 7: 100% rollback on access trails developed for stream crossing

BIOPHYSICAL CONDITIONS

SOILS / TERRAIN	Kmg, Opg, Kmg, Opg, Kmg, Opg, Kig, Opg, Kig, Kmg, Opg, Ovg, Kmg, Opg, Kmg, Opg, Kmg, Fmg, Hhg, Fmg, Opg, Fmg
POTENTIAL PERMAFROST	
VEGETATION / RARE PLANTS	Vegetation Survey Site; Vegetation Survey Site
WILDLIFE RESOURCES	Active Beaver Lodge; Potential Trumpeter Swan Habitat; Potential Trumpeter Swan Habitat; High quality moose and black throated green warbler habitat
ARCHAEOLOGICAL	
FISHERIES RESOURCES	Tributary to Townsoitoi Creek KP 48.9 Low habitat value; Hay River KP 54.1 Moderate habitat value





Kp Marker
EnCana Proposed Pipeline Route
Matchline
Proposed Vegetation Survey Site
Proposed Wildlife Survey Site
Vegetation Communities

TERRAIN MAP UNITS

Mineral
- Fmg - moderately well drained fluvial material
- Kig - imperfectly drained glaciolacustrine material
- Kigp - imperfectly drained glaciolacustrine material with potential permafrost
- Kmg - moderately well drained glaciolacustrine material

Organic
- Opg - poorly drained organic material
- Opgp - poorly drained organic material with potential permafrost
- Ovg - very poorly drained organic material

Other
- Hhg - Waterbodies
- Fmga, Kiga, Kmga, Opga - terrain disturbed through anthropogenic means

ENVIRONMENTAL PROTECTION MEASURES

SOIL HANDLING	
WATER CROSSINGS	Note 2; Note 1
RECLAMATION	Note 6; Note 3: East from the seismic line intersection; Note 3: East from the dry meander scar
SITE SPECIFIC MEASURES	Seed mineral soils with approved seed mix (Fmg, Kig, Kigp, Kmg); Bridge span will require temporary support structure west side of sand bar; Note 6; Note 7; Seed mineral soils with approved seed mix (Fmg, Kig, Kigp, Kmg)
TIMING CONSTRAINTS	Fisheries April - Dec.; Fisheries April - Dec.
ARCHAEOLOGICAL MITIGATION	

PREPARED FOR: ENCANA

PREPARED BY: AXYS Environmental Consulting Ltd

EnCana Proposed Ekwan Pipeline Route Alignment Sheets

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ENVIRONMENTAL NOTES

Note 1: HDD is preferred crossing technique; otherwise isolated open cut (dam & pump or flume)

Note 2: Dam and pump or flume isolation if flowing; otherwise open cut if dry or frozen

Note 3: 200m of rollback

Note 4: 100 - 150m of rollback

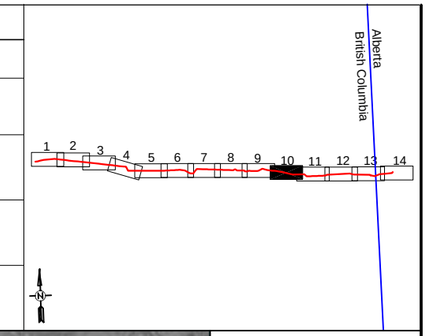
Note 5: For areas of permafrost that, after construction, may impact the environment or the pipeline integrity, implement measures outlined in the EPP (Appendix 13D.16)

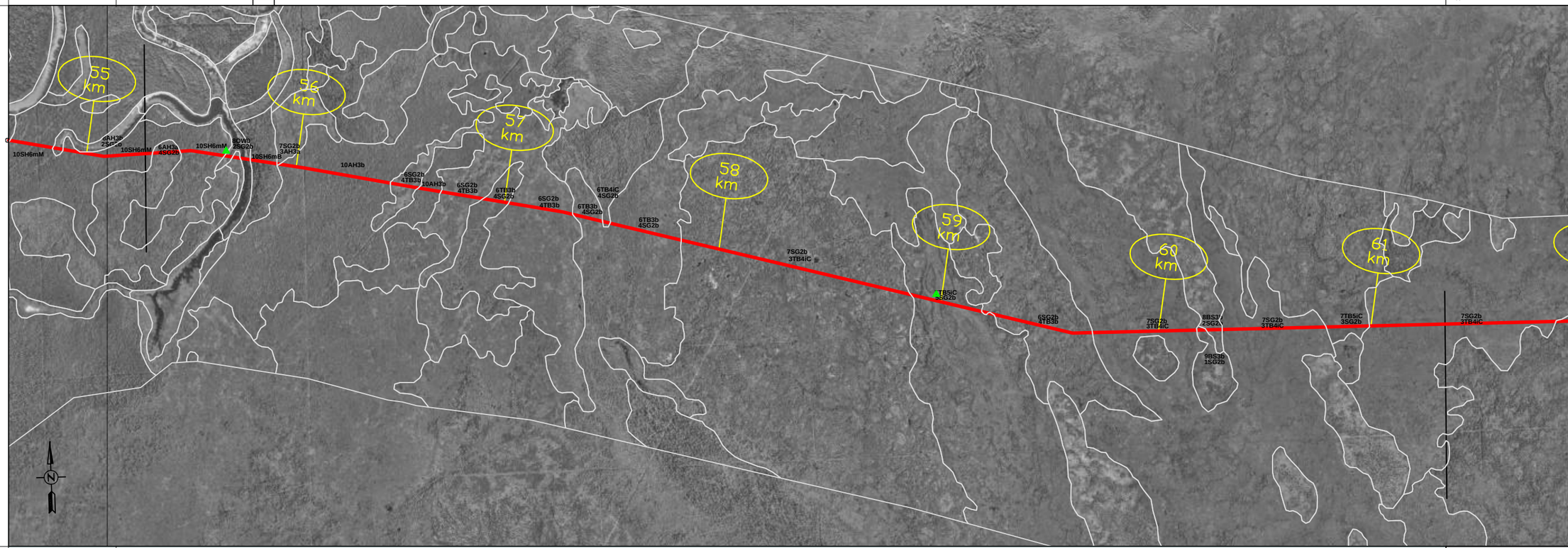
Note 6: If isolated open cut, channel & bank restoration measures to be applied as appropriate (Appendix 13D.B.4.4)

Note 7: 100% rollback on access trails developed for stream crossing

BIOPHYSICAL CONDITIONS

SOILS / TERRAIN	Fmg, Opg, Fmg, Hhg, Fmg, Opg, Ovg, Opg, Ovg, Opg, Ovg, Opg, Kig/Ovg, Ovg, Opg, Ovg, Kig, Ovg
POTENTIAL PERMAFROST	Speckled bog, some thaw ponds; No cutline; degrading permafrost with thaw ponds; No cutline; degrading permafrost, with thaw ponds; No cutline; degrading permafrost, with thaw ponds; No cutline; degrading permafrost, with thaw ponds
VEGETATION / RARE PLANTS	Vegetation Survey Site; Vegetation Survey Site
WILDLIFE RESOURCES	High quality moose and black - throated green warbler habitat habitat
ARCHAEOLOGICAL	
FISHERIES RESOURCES	Tributary to Hay River KP 55.7 low to negligible habitat





Kp Marker

EnCana Proposed Pipeline Route

Matchline

Proposed Vegetation Survey Site

Proposed Wildlife Survey Site

Vegetation Communities

TERRAIN MAP UNITS

Mineral

Fmg - moderately well drained fluvial material

Kig - imperfectly drained glaciolacustrine material

Kigp - imperfectly drained glaciolacustrine material with potential permafrost

Kmg - moderately well drained glaciolacustrine material

Organic

Opg - poorly drained organic material

Opgp - poorly drained organic material with potential permafrost

Ovg - very poorly drained organic material

Other

Hhg - Waterbodies

Fmga, Kiga, Kmga, Opga - terrain disturbed through anthropogenic means

ENVIRONMENTAL PROTECTION MEASURES

SOIL HANDLING	
WATER CROSSINGS	Note 2
RECLAMATION	Note 6; Seed mineral soils with approved seed mix (Fmg, Kig, Kigp, Kmg)
SITE SPECIFIC MEASURES	
TIMING CONSTRAINTS	Fisheries April - Dec.
ARCHAEOLOGICAL MITIGATION	

PREPARED FOR: ENCANA

PREPARED BY: AXYS Environmental Consulting Ltd

EnCana Proposed Ekwan Pipeline Route
Alignment Sheets

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ENVIRONMENTAL NOTES

Note 1: HDD is preferred crossing technique; otherwise isolated open cut (dam & pump or flume)

Note 2: Dam and pump or flume isolation if flowing; otherwise open cut if dry or frozen

Note 3: 200m of rollback

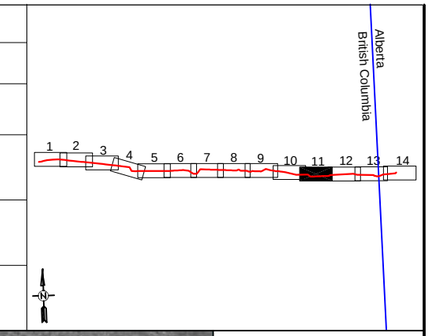
Note 4: 100 - 150m of rollback

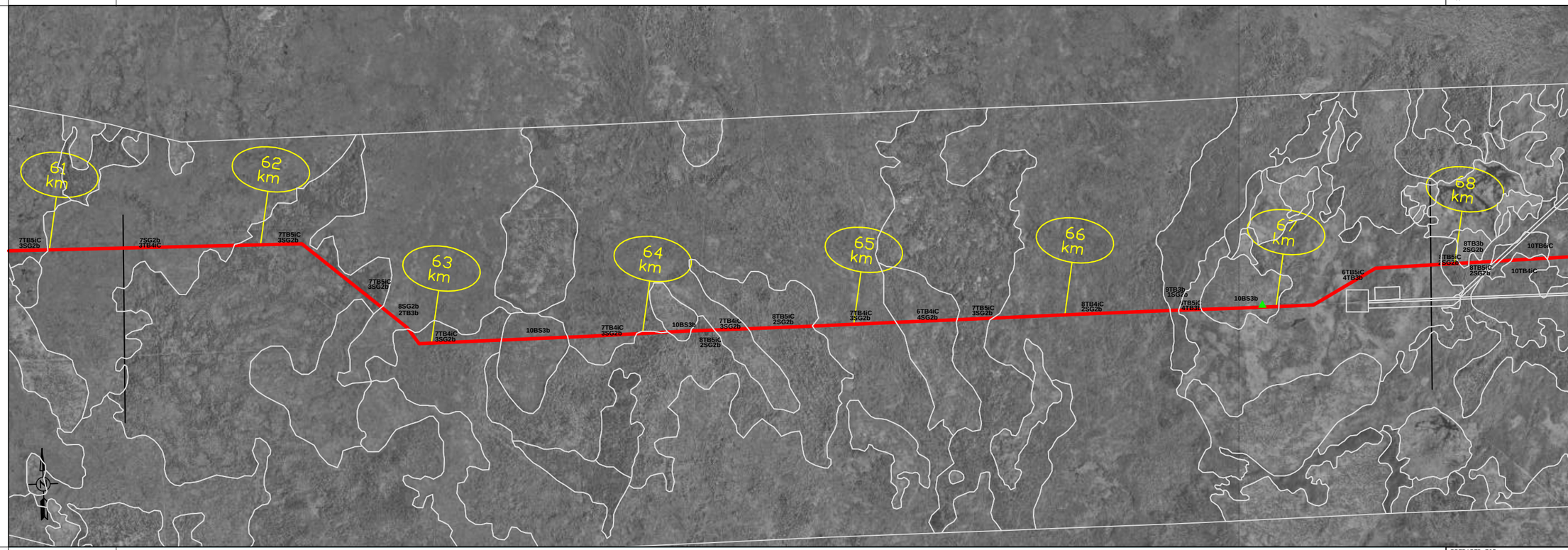
Note 5: For areas of permafrost that, after construction, may impact the environment or the pipeline integrity, implement measures outlined in the EPP (Appendix 13D.16)

Note 6: If isolated open cut, channel & bank restoration measures to be applied as appropriate (Appendix 13D.B.4.4)

BIOPHYSICAL CONDITIONS

SOILS / TERRAIN	Ovg; Kig; Ovg; Opg; Kig; Opg; Kig; Opg; Kig; Opg; Kig; Opg; Kig; Opg; Kig
POTENTIAL PERMAFROST	No cutline, degrading permafrost with thaw ponds; Speckled bog, no thaw ponds visible on air photos; Speckled bog, some thaw ponds
VEGETATION / RARE PLANTS	Vegetation Survey Site
WILDLIFE RESOURCES	
ARCHAEOLOGICAL	
FISHERIES RESOURCES	





Kp Marker

EnCana Proposed Pipeline Route

Matchline

Proposed Vegetation Survey Site

Proposed Wildlife Survey Site

Vegetation Communities

TERRAIN MAP UNITS

Mineral

Fmg - moderately well drained fluvial material

Kig - imperfectly drained glaciolacustrine material

Kigp - imperfectly drained glaciolacustrine material with potential permafrost

Kmg - moderately well drained glaciolacustrine material

Organic

Opg - poorly drained organic material

Opgp - poorly drained organic material with potential permafrost

Ovg - very poorly drained organic material

Other

Hhg - Waterbodies

Fmga, Kiga, Kmga, Opga — terrain disturbed through anthropogenic means

ENVIRONMENTAL PROTECTION MEASURES

SOIL HANDLING	
WATER CROSSINGS	
RECLAMATION	Continuous rollback in all closed forest stands (i.e. non-muskeg areas); Seed mineral soils with approved seed mix (Fmg, Kig, Kigp, Kmg); Continuous rollback in all closed forest stands (i.e. non-muskeg areas)
SITE SPECIFIC MEASURES	
TIMING CONSTRAINTS	
ARCHAEOLOGICAL MITIGATION	

PREPARED FOR: ENCANA

PREPARED BY: AXYS Environmental Consulting Ltd

EnCana Proposed Ekwan Pipeline Route
Alignment Sheets

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ENVIRONMENTAL NOTES

Note 1: HDD is preferred crossing technique; otherwise isolated open cut (dam & pump or flume)

Note 2: Dam and pump or flume isolation if flowing; otherwise open cut if dry or frozen

Note 3: 200m of rollback

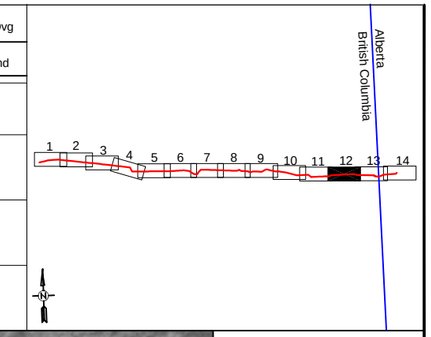
Note 4: 100 - 150m of rollback

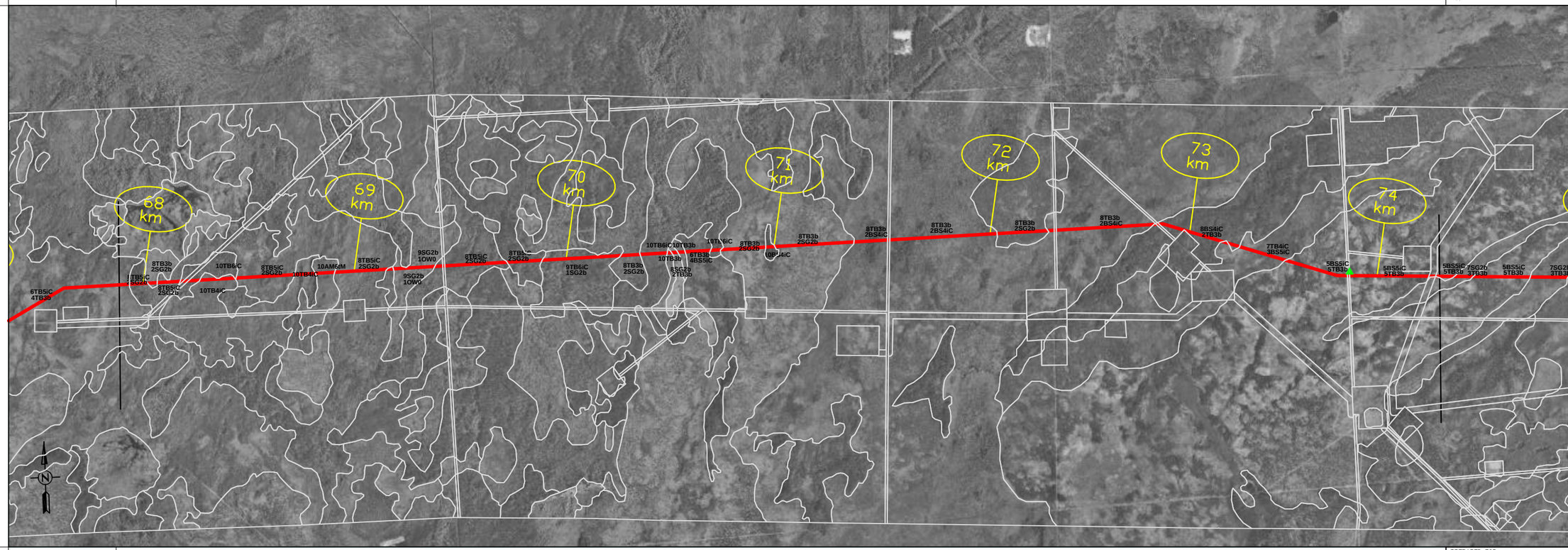
Note 5: For areas of permafrost that, after construction, may impact the environment or the pipeline integrity, implement measures outlined in the EPP (Appendix 13D.16)

Note 6: If isolated open cut, channel & bank restoration measures to be applied as appropriate (Appendix 13D.B.4.4)

BIOPHYSICAL CONDITIONS

SOILS / TERRAIN	Kig, Opg, Kig, Opgp, Kig, Opgp, Kmg, Kig, Kmg, Ovg, Kig, Opg, Kig, Opgp, Ovg, Opgp, Kig, Opg, Opgp, Opg, Opgp, Opg, Opgp, Opg/Opgp, Ovg
POTENTIAL PERMAFROST	Speckled bog, occasional thaw pond; Speckled bog, occasional thaw pond
VEGETATION / RARE PLANTS	Vegetation Survey Site
WILDLIFE RESOURCES	
ARCHAEOLOGICAL	
FISHERIES RESOURCES	





- Kp Marker
- EnCana Proposed Pipeline Route
- Matchline
- Proposed Vegetation Survey Site
- Proposed Wildlife Survey Site
- Vegetation Communities

TERRAIN MAP UNITS

Mineral

- Fmg - moderately well drained fluvial material
- Kig - imperfectly drained glaciolacustrine material
- Kigp - imperfectly drained glaciolacustrine material with potential permafrost
- Kmg - moderately well drained glaciolacustrine material

Organic

- Opg - poorly drained organic material
- Opgp - poorly drained organic material with potential permafrost
- Ovg - very poorly drained organic material

Other

- Hhg - Waterbodies
- Fmga, Kiga, Kmga, Opga — terrain disturbed through anthropogenic means

ENVIRONMENTAL PROTECTION MEASURES

SOIL HANDLING	
WATER CROSSINGS	
RECLAMATION	Seed mineral soils with approved seed mix (Fmg, Kig, Kigp, Kmg)
SITE SPECIFIC MEASURES	
TIMING CONSTRAINTS	
ARCHAEOLOGICAL MITIGATION	

PREPARED FOR: ENCANA

PREPARED BY: AXYS Environmental Consulting Ltd

EnCana Proposed Ekwan Pipeline Route
Alignment Sheets

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ENVIRONMENTAL NOTES

Note 1: HDD is preferred crossing technique; otherwise isolated open cut (dam & pump or flume)

Note 2: Dam and pump or flume isolation if flowing; otherwise open cut if dry or frozen

Note 3: 200m of rollback

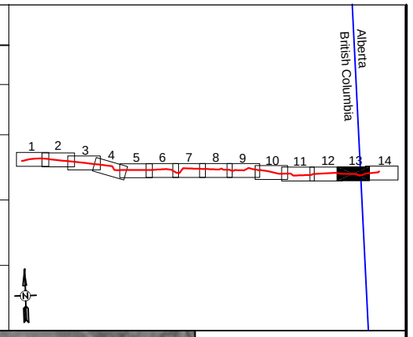
Note 4: 100 - 150m of rollback

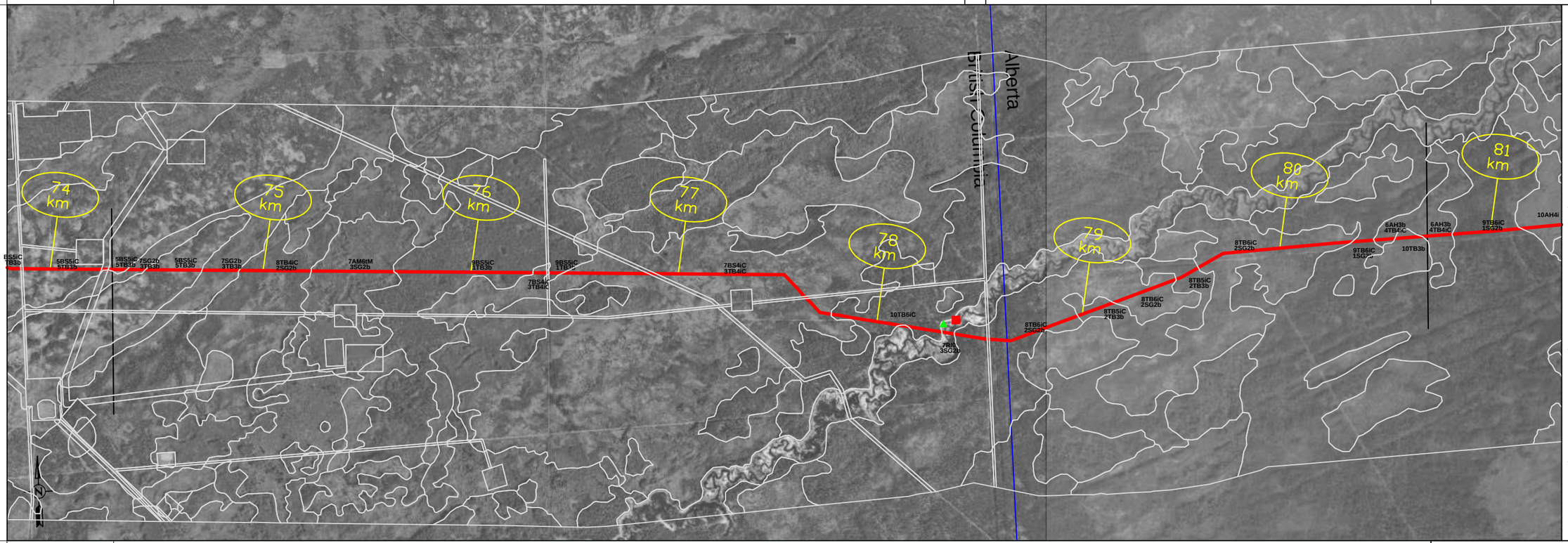
Note 5: For areas of permafrost that, after construction, may impact the environment or the pipeline integrity, implement measures outlined in the EPP (Appendix 13D.16)

Note 6: If isolated open cut, channel & bank restoration measures to be applied as appropriate (Appendix 13D.B.4.4)

BIOPHYSICAL CONDITIONS

SOILS / TERRAIN	Ovg; Opg/Opgp; Ovg; Opg; Kmg; Opg; Kig; Hhg; Ovg; Kig; Opg; Opgp
POTENTIAL PERMAFROST	Speckled bog, occasional thaw pond; Speckled bog, occasional thaw pond; Speckled bog, no thaw ponds visible on airphoto
VEGETATION / RARE PLANTS	Vegetation Survey Site
WILDLIFE RESOURCES	Active beaver lodge
ARCHAEOLOGICAL	
FISHERIES RESOURCES	Little Hay River KP 78.3 Low to moderate habitat value





Kp Marker
EnCana Proposed Pipeline Route
Matchline
Proposed Vegetation Survey Site
Proposed Wildlife Survey Site
Vegetation Communities

TERRAIN MAP UNITS

Mineral

- Fmg - moderately well drained fluvial material
- Kig - imperfectly drained glaciolacustrine material
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- Kmg - moderately well drained glaciolacustrine material

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- Opg - poorly drained organic material
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- Ovg - very poorly drained organic material

Other

- Hhg - Waterbodies
- Fmga, Kiga, Kmga, Opga - terrain disturbed through anthropogenic means

ENVIRONMENTAL PROTECTION MEASURES

SOIL HANDLING	
WATER CROSSINGS	Note 1
RECLAMATION	Seed mineral soils with approved seed mix (Fmg, Kig, Kigp, Kmg); Note 6, Note 7; Note 3 east of north-south winter road; Seed mineral soils with approved seed mix (Fmg, Kig, Kigp, Kmg)
SITE SPECIFIC MEASURES	
TIMING CONSTRAINTS	Fisheries April - Dec.
ARCHAEOLOGICAL MITIGATION	

ENVIRONMENTAL NOTES

Note 1: HDD is preferred crossing technique; otherwise isolated open cut (dam & pump or flume)

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Note 6: If isolated open cut, channel & bank restoration measures to be applied as appropriate (Appendix 13D.B.4.4)

Note 7: 100% rollback on access trails developed for stream crossing

PREPARED FOR: ENCANA

PREPARED BY: AXYS Environmental Consulting Ltd

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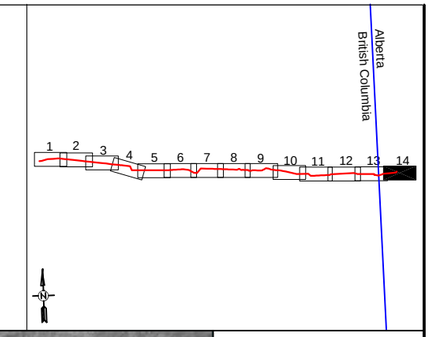
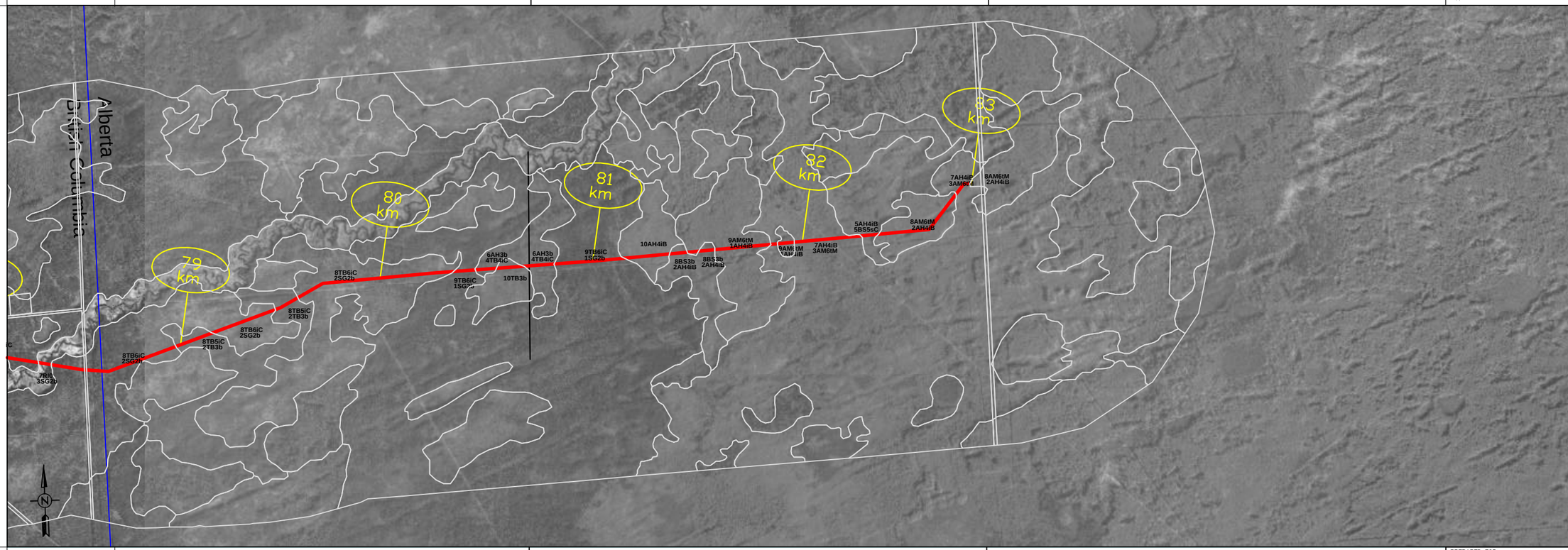
BIOPHYSICAL CONDITIONS							
	SOILS / TERRAIN		Opg	Kig	Opg	Kmg	Opg	Kmg
	POTENTIAL PERMAFROST		Speckled bog, no thaw ponds visible on airphotos				
	VEGETATION / RARE PLANTS						
	WILDLIFE RESOURCES						
	ARCHAEOLOGICAL						
	FISHERIES RESOURCES						





Kp Marker

EnCana Proposed Pipeline Route

Matchline

Proposed Vegetation Survey Site

Proposed Wildlife Survey Site

Vegetation Communities

TERRAIN MAP UNITS

Mineral

Fmg - moderately well drained fluvial material

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Kigp - imperfectly drained glaciolacustrine material with potential permafrost

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Organic

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Ovg - very poorly drained organic material

Other

Hhg - Waterbodies

Fmga, Kiga, Kmga, Opga - terrain disturbed through anthropogenic means

ENVIRONMENTAL PROTECTION MEASURES			
	SOIL HANDLING		
	WATER CROSSINGS		
	RECLAMATION	Seed mineral soils with approved seed mix (Fmg, Kig, Kigp, Kmg)	Note 3; southwest from m/s
	SITE SPECIFIC MEASURES		
	TIMING CONSTRAINTS		
	ARCHAEOLOGICAL MITIGATION		

PREPARED FOR:

ENCANA

PREPARED BY:

AXYS Environmental Consulting Ltd

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