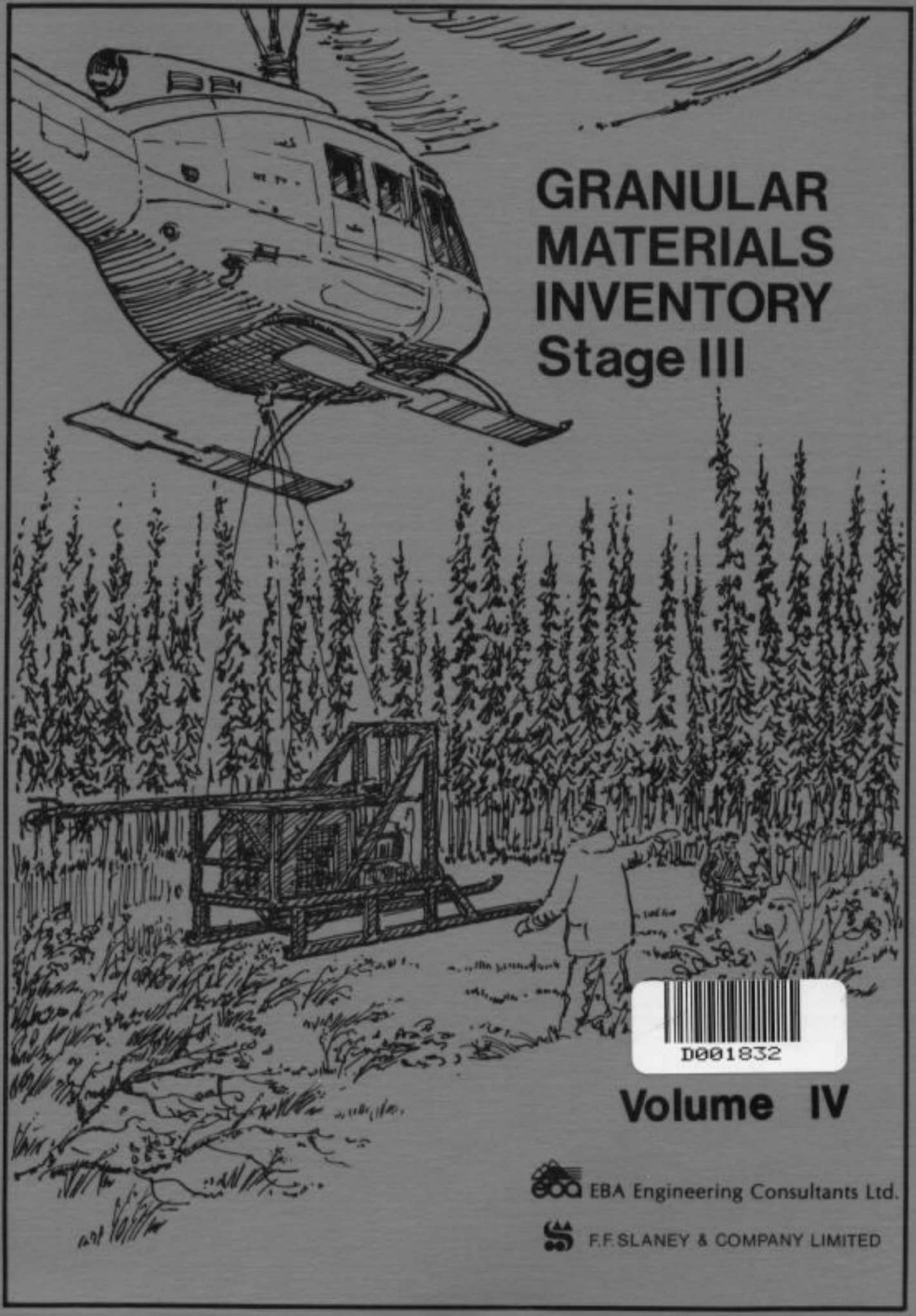


GRANULAR MATERIALS INVENTORY Stage III

D001832

Volume IV

EBA Engineering Consultants Ltd.

F.F. SLANEY & COMPANY LIMITED

COPY NO. 2

GRANULAR MATERIALS INVENTORY STAGE III

VOLUME IV

NORTH HALF

SITES 1111 - 1156

Submitted to:

GOVERNMENT OF CANADA

DEPARTMENT OF INDIAN AND NORTHERN AFFAIRS

APRIL, 1974

eba Engineering Consultants Ltd.

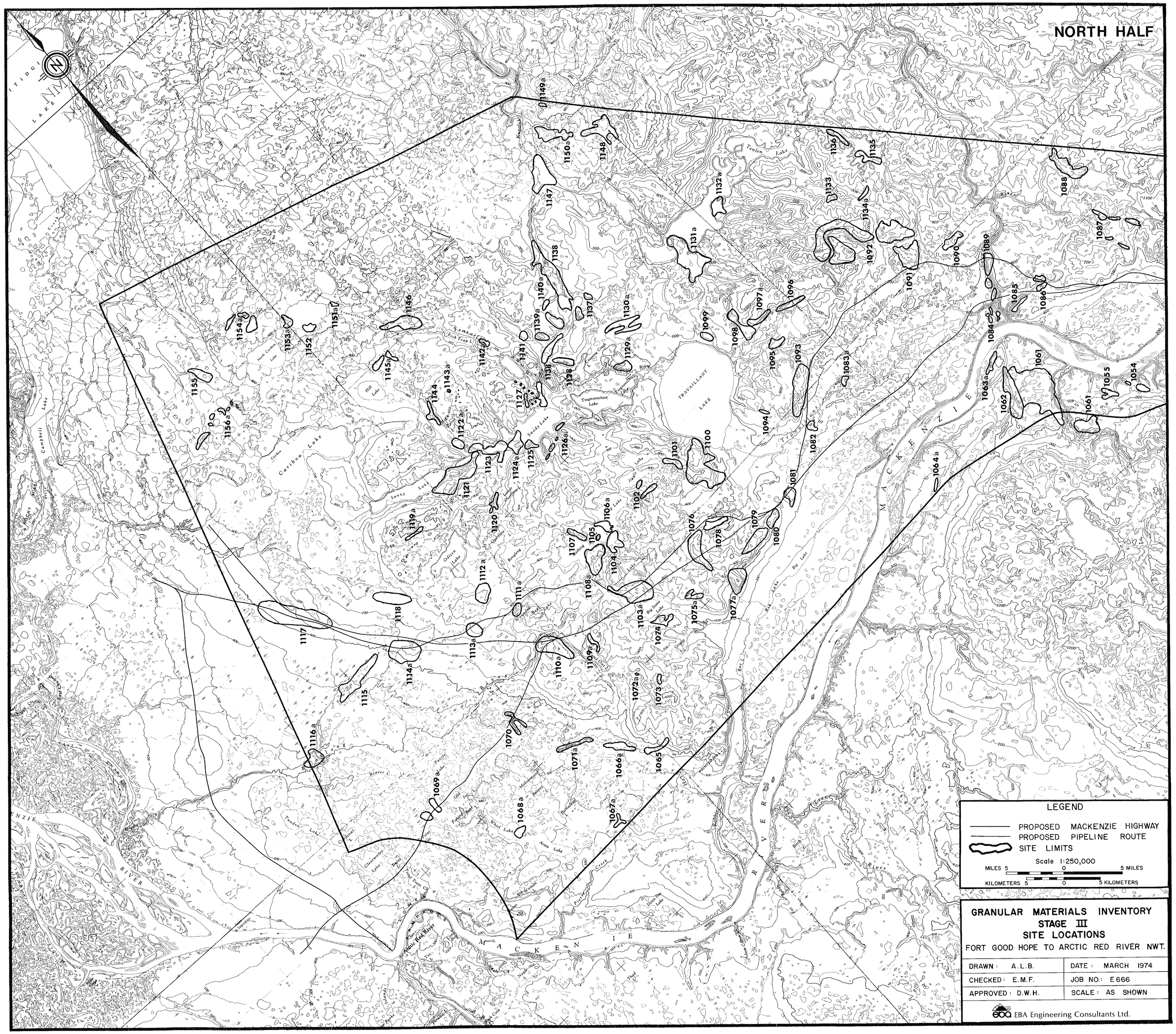
Site No.	Material Type		Suitability of Material	Estimated Volume (cu. yd.)	Est'd Recov. Depth (feet)	Overburden			Ground Ice (content)	Drainage	Method of Extraction	Min. Haul. Dist. (mi.)	Relative Environmental Sensitivity	Assessment
	Description	Sym.				Type	Depth (feet)	Disposal						
1054	Gravelly, sand and silt	GP-GM	General Fill	2,000,000	--	Peat	1	Strip and Stockpile	Irregular	Good	Conventional and 3d Stock-pile	9	Low - 225	Good Prospect
1055	Gravel and Sand	GP-GM	General Fill	525,000	--	--	Thin	Strip	--	Good	Conventional	9	Low - 205	Fair to Good Prospect
1061	Sand and Gravel	GW-GM	Construction Aggregate	Great	--	--	Thin	Strip	Unfrozen	Variable	Conventional	10	Moderate - 295	Good Prospect
1062	Sand and Gravel	GM	General Fill	Great	--	--	Thin	Strip	Unfrozen	Variable	Conventional	7-12	Moderate - 285	Good Prospect
1063a	Sand	SM	Poor	4,500,000	--	--	Thin	--	Frozen	Good	Conventional	9-5	High - 365	Not Recommended
1064a	Silt	--	Unsuitable	--	--	--	--	--	--	--	--	9	N.D.	Not Recommended
1065	Sand and Gravel	--	General Fill	6,000,000	--	--	Thin	--	Unfrozen	Good	Conventional	12	Moderate - 259	Fair Prospect
1066a	Silt	--	Unsuitable	--	--	--	--	--	--	--	--	11-16	N.D.	Not Recommended
1067a	Silt	--	Unsuitable	--	--	--	--	--	--	--	--	20	N.D.	Not Recommended
1068a	Silt	--	Unsuitable	--	--	--	--	--	--	--	--	18	N.D.	Not Recommended
1069a	Silt and Sand	--	Unsuitable	--	--	--	--	--	--	--	--	13	N.D.	Not Recommended
1070	Gravel and Sand	SC	General Fill	N.D.	N.D.	Clay and Peat	½-1½	Strip and Stockpile	Irregular	Fair	Conventional	9	N.D.	Poor to Fair Prospect
1071a	Silt	--	Unsuitable	--	--	--	--	--	--	--	--	13½	N.D.	Not Recommended
1072a	Silt	--	Unsuitable	--	--	--	--	--	--	--	--	6-7	N.D.	Not Recommended
1073	Silty sand some Gravel	SM	General Fill	4,500,000	10½	Negligible	--	--	Frozen under 10½	Good	Conventional	7-8	Low - 200	Fair Prospect
1074	Sandy silt	--	Unsuitable	N.D.	--	Negligible	--	--	--	Good	Conventional	2-3	N.D.	Poor Prospect
1075a	Silt	--	Unsuitable	--	--	--	--	--	--	--	--	4-5	N.D.	Not Recommended
1076	Sand and Gravel	--	Some Aggregate to General Fill	2,500,000	--	Peat	1½	Strip and Stockpile	Frozen	Good	Conventional	1	Moderate - 270	Good Prospect
1077a	Shale	--	Poor	--	--	Clay	28	--	Frozen	Good	--	4-6	N.D.	Not Recommended
1078	Shale	--	General Fill	N.D.	N.D.	N.D.	Thick	Strip and Stockpile	N.D.	Good	Blast and Quarry	1	Moderate - 255	Fair Prospect
1079	Shale	--	General Fill	N.D.	N.D.	Clay	14	Strip and Stockpile	Not Frozen	Good	Blast and Quarry	2	N.D.	Fair Prospect
1080	Shale	--	General Fill	N.D.	N.D.	Clay and Shale	14	Strip and Stockpile	N.D.	Good	Blast and Quarry	½	Low - 225	Good Prospect
1081	Shale	--	General Fill	N.D.	N.D.	Clay and Shale	11	Strip and Stockpile	N.D.	Good	Blast and Quarry	0	Low - 220	Fair to Good
1082	Sand and Gravel	GW	General Fill	2,200,000	12	Negligible	--	--	Irregular to very High	Fair	Conventional ½ with Stock-piling	½	Moderate - 260	Poor Prospect
1083a	Sandy Silt	SM-ML	Unsuitable	N.D.	N.D.	Negligible	--	--	Unfrozen	Fair to Good	--	2-3½	N.D.	Not Recommended
1084	Sand and Gravel	SM	General Fill	2,000,000	7	Topsoil	Thin	Strip and Stockpile	Frozen	Poor to Fair	Rip and Doze	1½-4½	High - 335	Poor Prospect
1085	Sand, Gravelly	GW-GM	General Fill	1,200,000	5	Peat and Silt	1	Strip and Stockpile	Unfrozen	Good	Conventional	1½-3	High - 385	Poor to Fair Prospect
1086	Sand	SP-SM	General Fill	1,300,000	12-15	Negligible	--	--	Frozen at 8 feet	Good	Conventional & Stockpile	0-1½	N.D.	Fair Prospect
1087	Silt, sand and Gravel	GM	General Fill	1,800,000	N.D.	Negligible	Thin	--	Frozen at 8 feet	Good	Conventional & Stockpile	4	Low - 190	Good to Fair Prospect
1088	Sand	SM	General Fill	13,800,000	8	Negligible	Thin	--	Frozen at 8½ feet	Good	Conventional & Stockpile	10	Moderate - 255	Fair Prospect
1089	Sand	SP-SM	General Fill	7,500,000	7	Negligible	Thin	--	Frozen at 7½ feet	Good	Conventional & Stockpile	0	High - 335	Fair to Poor Prospect
1090	Shale	--	General Fill	N.D.	N.D.	Clay and Shale	7-15	Strip and Stockpile	Frozen	Fair	Blast and Quarry	1½-6	Moderate - 275	Good to Fair Prospect
1091	Shale	--	General Fill	N.D.	N.D.	Clay and Shale	7-15	Strip and Stockpile	N.D.	Fair to Good	Blast and Quarry	0	Low - 205	Good to Fair Prospect
1092	Shale	--	General Fill	N.D.	N.D.	Clay and Shale	7-15	Strip and Stockpile	Frozen	Good	Blast and Quarry	3	Low - 195	Fair to Poor Prospect
1093	Shale	--	General Fill	N.D.	N.D.	Weathered Shale	4	Strip and Stockpile	N.D.	Fair to Good	Blast and Quarry	½	Low - 225	Good to Fair Prospect
1094	Shale	--	Subgrade Construction	N.D.	N.D.	Clay and Shale	15	Strip and Stockpile	N.D.	Fair	Blast and Quarry	4	Low - 210	Fair to Poor Prospect
1095	Sand	GW-SM	General Fill	N.D.	N.D.	Clay	4	Strip and Stockpile	Unfrozen to 11 ft.	Good	Conventional & Stockpile	3½	Moderate - 265	Fair Prospect
1096	Gravel and Sand	GW-GM	General Fill	1,250,000	N.D.	Peat	0-3	Stockpiled	Unfrozen to 11 ft.	Fair	Conventional	5	Moderate - 260	Fair Prospect
1097a	Clay and Sand	SC	Unsuitable	N.D.	N.D.	N.D.	--	--	N.D.	N.D.	--	6	N.D.	Not Recommended

Site No.	Material Type		Suitability of Material	Estimated Volume (cu. yd.)	Est'd Recov. Depth (feet)	Overburden			Ground Ice (content)	Drainage	Method of Extraction	Min. Haul. Dist. (mi.)	Relative Environmental Sensitivity	Assessment
	Description	Sym.				Type	Depth (feet)	Disposal						
1098	Sandy Gravel	GW-GM	Concrete Aggregate	13,000,000	N.D.	Negligible	--	--	Unfrozen	Good	Conventional	7	Moderate - 235	Excellent Prospect
1099	Siltstone	--	General Fill	N.D.	N.D.	Silt	5	Strip and Stockpile	Frozen	Good	Blast and Quarry	10	N.D.	Fair to Good Prospect
1100	Shale	--	General Fill	Very Great	N.D.	Clay and Shale	9	Strip and Stockpile	N.D.	Good	Blast and Quarry	5	Moderate - 290	Good Prospect
1101	Sandy Gravel	GM	General Fill & Aggregate	1,700,000	N.D.	Negligible	Thin	--	N.D.	Good	Conventional	6	Moderate - 270	Good Prospect
1102	Gravel and Sand	GM-SM	General Fill	650,000	N.D.	Topsoil and Till	1-4	Strip and Stockpile	Frozen at 5' - 10'	Good	Conventional	5	Moderate - 280	Fair to Good Prospect
1103a	Shale	--	General Fill	N.D.	N.D.	Clay and Weathered Shale	25	--	Frozen	Fair	--	0	Low - 245	Not Recommended
1104	Sand and Gravel	GM-SM	General Fill Some Aggregate	14,300,000	N.D.	Peat and Clay	0-4	Strip and Stockpile	Frozen	Good	Blasting or Ripping	3	Moderate - 315	Good Prospect
1105	Gravel and Sand	GP-GM	General Fill Some Aggregate	286,000	N.D.	Negligible	Thin	--	Unfrozen	Good	Conventional	6	High - 350	Poor Site
1106a	Silt	--	Unsuitable	--	--	N.D.	--	--	Frozen	Good	--	--	N.D.	Not Recommended
1107	Gravel	GM	General Fill	1,000,000	N.D.	Topsoil	Thin	Strip and Stockpile	N.D.	Good	Conventional	6	Moderate - 310	Fair to Good Prospect
1108a	Gravel and Clay	--	Unsuitable	N.D.	N.D.	N.D.	--	--	N.D.	Good	--	1½	Moderate - 315	Not Recommended
1109a	Silt	--	Unsuitable	N.D.	N.D.	N.D.	--	--	N.D.	--	--	5	N.D.	Not Recommended
1110a	Sand and Silt	--	Unsuitable	N.D.	--	N.D.	--	--	Frozen	Good	--	4	Moderate - 260	Not Recommended
1111a	Silt	--	Unsuitable	N.D.	--	N.D.	--	--	N.D.	Fair	--	2	N.D.	Not Recommended
1112a	Shale	--	Unsuitable	N.D.	--	Peat and Till	20	--	N.D.	Fair	--	1½	Low - 180	Not Recommended
1113a	Shale	--	Unsuitable	N.D.	--	Till and wet shale	25	--	High	--	--	0	Low - 210	Not Recommended
1114a	Shale and Siltstone	--	Unsuitable	N.D.	--	Till and wet shale	--	--	N.D.	--	--	½	Low - 235	Not Recommended
1115	Sand and Sandstone	--	General Fill	N.D.	N.D.	Clayey Sand	6	Strip and Stockpile	Not Frozen	Poor	Conventional & Quarry	4½	Low - 205	Fair to Good Prospect
1116a	Gravelly Sand	GM-SM	General Fill	65,000	--	Peat	Thin	Strip and Stockpile	Not Frozen	Good	--	12	High - 350	Not Recommended
1117	Shale	--	General Fill	N.D.	N.D.	Silt till	4-10	Strip and Stockpile	N.D.	Fair	Blast and Quarry	0	Low - 195	Good Prospect
1118	Shale	--	General Fill	N.D.	N.D.	Topsoil and till	8-14	Strip and Stockpile	Frozen	Fair	Blast and Quarry	2½	Low - 180	Fair to Good Prospect
1119a	Clay	--	Unsuitable	N.D.	N.D.	N.D.	--	--	N.D.	Good	--	8	N.D.	Not Recommended
1120	Sand and Gravel	GM	Aggregate and Fill	1,500,000	N.D.	Peat, silt and clay	2	Strip and Stockpile	Frozen at 7'	Good	Conventional	8½	High - 340	Good Prospect
1121	Sand and Gravel	GM	Aggregate and Fill	26,500,000	N.D.	Negligible	--	--	Unfrozen to 16'	Good	Conventional	14	High - 340	Good Prospect
1122a	Silt	--	Unsuitable	N.D.	N.D.	N.D.	--	--	Frozen	Fair	--	--	Moderate - 305	Not Recommended
1123	Gravel	GM	Aggregated General Fill	2,200,000	12	Negligible	--	--	Frozen at 9 - 12'	Good	Conventional	13	High - 350	Good Prospect
1124a	Sand and Gravel	GW-SM	General Fill	10,600,000	N.D.	Peat and Silt	3	Strip and Stockpile	Frozen	Poor	Conventional & Stockpile	13	High - 355	Not Recommended
1125	Gravel and Sand	GM	General Fill	N.D.	N.D.	Topsoil	Thin	--	N.D.	Good	Conventional	13	High - 350	Fair Prospect
1126a	Sand and Gravel	GW-GM	General Fill	Small	N.D.	Negligible	Thin	Strip and Stockpile	N.D.	Good	Conventional	13	High - 325	Not Recommended
1127	Sand and Gravel	GM	General Fill	5,700,000	N.D.	Negligible	--	--	Unfrozen to 21'	Good	Conventional	18	High - 365	Fair to Good Prospect
1128	Shale	--	General Fill	Great	N.D.	Clayey Silt	12	Strip and Stockpile	Frozen	Good	Blast and Quarry	20	Moderate - 285	Fair Prospect
1129a	Clay	CL	Unsuitable	N.D.	--	N.D.	--	--	Frozen	Fair	--	15	N.D.	Not Recommended
1130a	Clay	CL	Unsuitable	N.D.	--	N.D.	--	--	--	--	--	18	N.D.	Not Recommended
1131a	Clay (till)	--	Unsuitable	10,000,000	N.D.	N.D.	--	--	Frozen 20%	Good	--	15	High - 380	Not Recommended
1132a	Clayey Sand	SC	Unsuitable	N.D.	N.D.	N.D.	--	--	--	Good	--	14	N.D.	Not Recommended
1133	Sand and Gravel	SW-SM	General Fill	675,000	N.D.	Silt and Peat	Thin	Strip and Stockpile	N.D.	Good	Conventional	8½	Low - 210	Fair Prospect
1134a	Clay	--	Unsuitable	--	--	--	--	--	--	Good	--	7	N.D.	Not Recommended
1135	Sand and Gravel	GM	Concrete Aggregate	15,125,000	6-10	Negligible	Thin	--	Frozen at 8½'	Fair	Conventional	9½	Low - 230	Fair to Good Prospect
1136	Sand and Gravel	SM	General Fill	12,000,000	N.D.	Peat and Silt	Thin	--	Frozen	Poor	Conventional & Stockpile	12	Moderate - 270	Fair to Poor Prospect
1137	Gravel and Sand	SM	General Fill	N.D.	N.D.	Negligible	Thin	--	Unfrozen	Good	Conventional	21	Low - 225	Fair Prospect

Site No.	Material Type		Suitability of Material	Estimated Volume (cu. yd.)	Est'd Recov. Depth (feet)	Overburden			Ground Ice (content)	Drainage	Method of Extraction	Min. Haul. Dist. (mi.)	Relative Environmental Sensitivity	Assessment
	Description	Sym.				Type	Depth (feet)	Disposal						
1138	Sand and Gravel	GW-GM	Aggregate and General Fill	35,000,000	--	Peat, Silt	0-2	Strip and Stockpile	Frozen at 8½'	Good	Conventional & Stockpile	22	High - 355	Fair to Good Prospect
1139a	Shale	--	General Fill	N.D.	N.D.	N.D.	Deep	--	N.D.	Good	--	21	N.D.	Not Recommended
1140a	Clay	ND	Unsuitable	N.D.	N.D.	N.D.	--	--	N.D.	Fair	--	24	Low - 230	Not Recommended
1141	Sand and Gravel	GW-GM	General Fill	N.D.	N.D.	N.D.	Thin	--	N.D.	Poor	Conventional	24	Moderate - 260	Fair Prospect
1142a	Silt and Sand	--	Unsuitable	N.D.	N.D.	--	--	--	N.D.	--	--	25	Moderate - 295	Not Recommended
1143a	Sand and Gravel	GP-GM	General Fill	Small	N.D.	Negligible	Thin	--	N.D.	Good	Conventional	20	N.D.	Not Recommended
1144	Sand and Gravel	GM	General Fill	N.D.	N.D.	Clay	2	Strip and Stockpile	N.D.	Poor	Conventional & Stockpile	19	Moderate - 310	Fair Prospect
1145a	Sand and Gravel	--	Unsuitable	N.D.	N.D.	Peat and Silt	2	--	N.D.	N.D.	--	24	N.D.	Not Recommended
1146	Sand and Gravel	SM	General Fill	13,500,000	18	Negligible	Thin	--	Frozen	Good	Blasting or Rip	26	Moderate - 270	Fair Prospect
1147	Gravel and Sand	GP-SM	General Fill	16,000,000	--	Peat and Silt	2	Strip and Stockpile	Frozen at 6'	Good	Blast Stockpile	29	Low - 210	Fair Prospect
1148	Gravel and Sand	GP-GM	General Fill	N.D.	N.D.	Topsoil	Thin	--	N.D.	Fair	Conventional	29	Moderate - 265	Fair to Good Prospect
1149a	Clay	--	Unsuitable	N.D.	N.D.	--	--	--	N.D.	N.D.	--	32	N.D.	Not Recommended
1150a	Sand	SP-SM	General Fill	N.D.	N.D.	--	Thin	--	Frozen at 6'	Good	Conventional	25	Low - 205	Not Recommended
1151a	Shale	--	General Fill	N.D.	N.D.	Silt	19	--	Frozen	Poor	--	22	Moderate - 280	Not Recommended
1152a	Sand and Gravel	GP-GM	General Fill	8,200,000	N.D.	Peat and Silt	10	--	Frozen	Fair	--	18	High - 325	Not Recommended
1153a	Sand	GM	General Fill	N.D.	N.D.	Irregular	--	--	N.D.	Poor	--	18	Moderate - 315	Not Recommended
1154a	Sand and Gravel	GC	Unsuitable	N.D.	N.D.	--	--	--	Frozen	Poor	--	15	Moderate - 315	Not Recommended
1155	Shale and Siltstone	--	General Fill	N.D.	N.D.	Silt	8½	Strip and Stockpile	Frozen	Fair	Blast and Quarry	9	Moderate - 280	Fair to Poor Prospect
1156a	Silt	--	Unsuitable	N.D.	N.D.	--	--	--	N.D.	--	--	5	Moderate - 250	Not Recommended

Notes:

- N.D. — Not determined.
- N/A — Not applicable.
- SITE NUMBER: The site number, followed by an "a", codes sites which are not recommended for development.
- METHOD OF EXCAVATION: "Conventional" indicates use of such standard equipment as dozers, overhead loaders, backhoes, light rippers and trucks.
- MINIMUM HAULAGE DISTANCE: The minimum haulage distance is an air mileage from proposed pipeline and highway routes to the site.
- RELATIVE ENVIRONMENTAL SENSITIVITY: The relative environmental sensitivity is based on an environmental sensitivity index as established by F.F. Slaney and Co. Ltd.
- ASSESSMENT: Refer to site descriptions section.

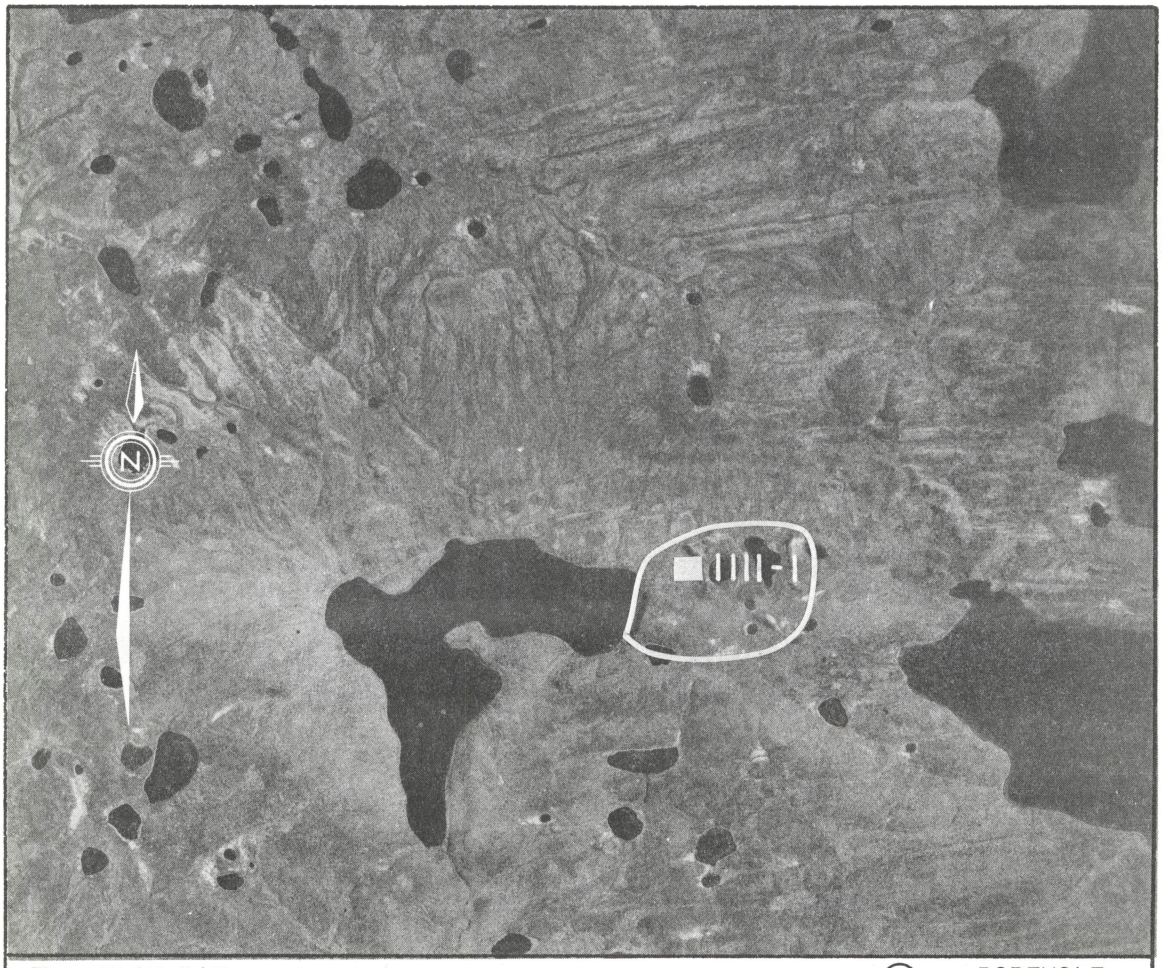

NORTH HALF
LEGEND
PROPOSED MACKENZIE HIGHWAY
PROPOSED PIPELINE ROUTE
SITE LIMITS
Scale 1:250,000
MILES 5 0 5 MILES
KILOMETERS 5 0 5 KILOMETERS
GRANULAR MATERIALS INVENTORY
STAGE III
SITE LOCATIONS
FORT GOOD HOPE TO ARCTIC RED RIVER NWT.
DRAWN: A.L.B.
DATE: MARCH 1974
CHECKED: E.M.F.
JOB NO.: E666
APPROVED: D.W.H.
SCALE: AS SHOWN
EBA Engineering Consultants Ltd.
TRAVAILLANT LAKE
Tregnantchiet Lake
Caribou Lake
Sunny Lake
Tenlen Lake
MACKENZIE RIVER

SITE IIIIa

Location: Site IIII is situated 1 1/2 miles west of Wounded Bear Lake on the proposed highway route and 2 miles north-east of the proposed pipeline route.

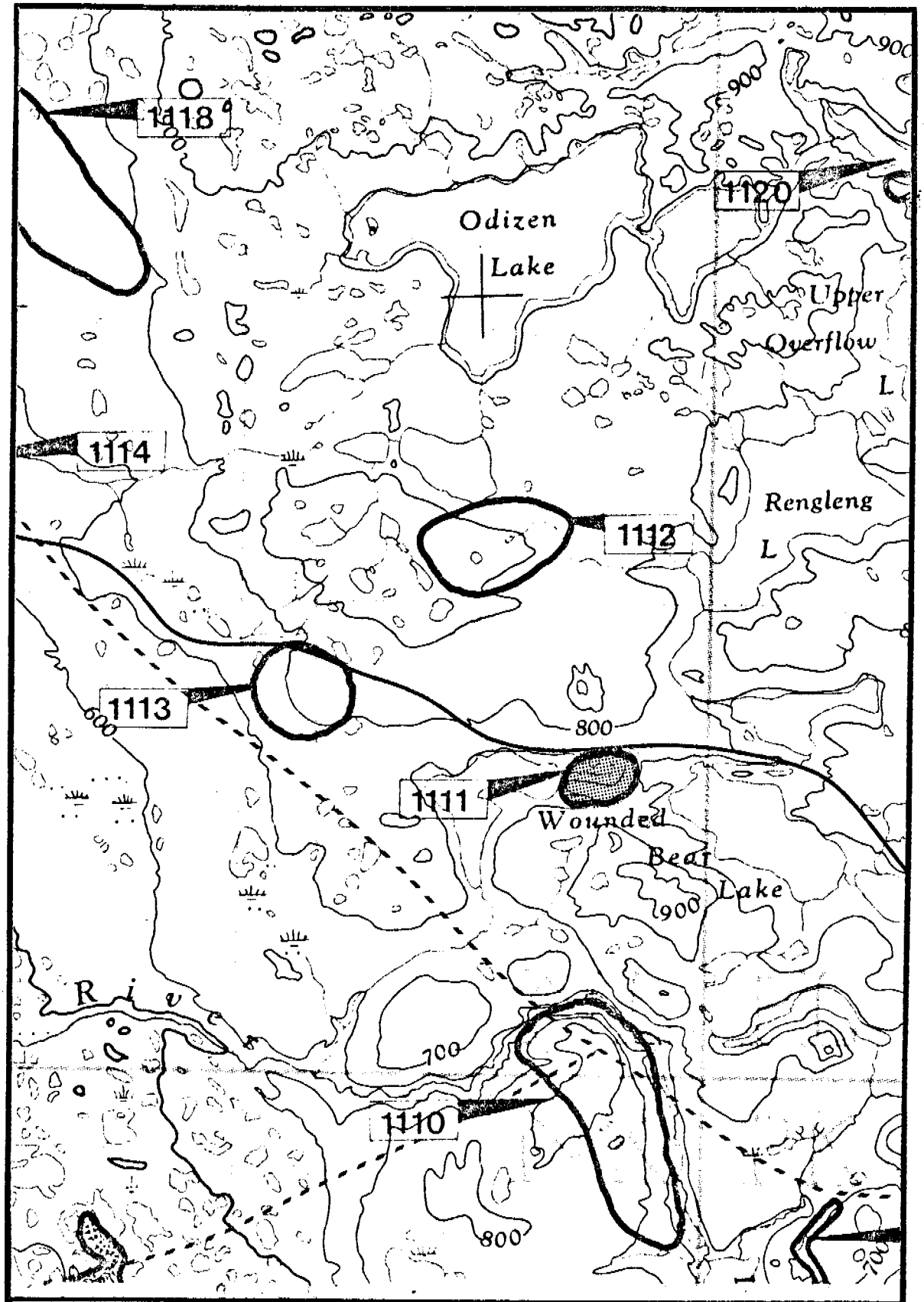
Material: Silt.

Assessment: The material at site IIII is unsuitable for construction purposes and therefore the site is not recommended for development.



□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A21584-50 SCALE: 1" = 5500' (approx.)



SITE LIMITS

PROPOSED GAS PIPELINE

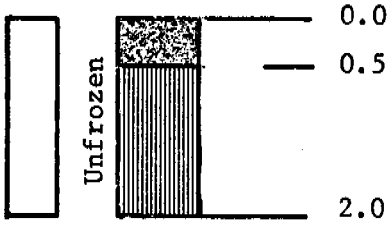
PROPOSED MACKENZIE HIGHWAY

MAPS: ARTIC RED RIVER 106-N

SCALE: 1:125,000

TEST PIT LOG

TP 1111-4



Moss

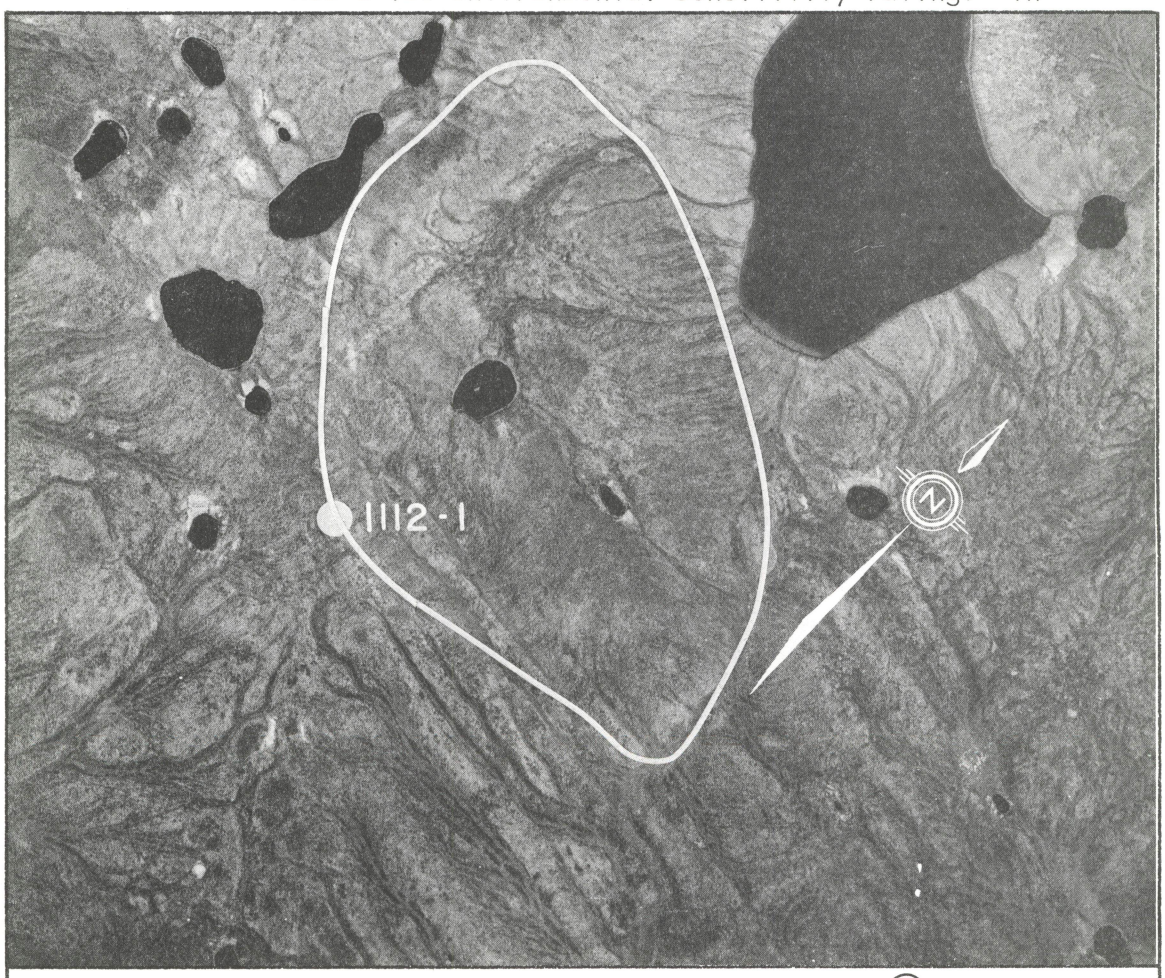
Silt, light brown
dry

SITE 1112a

Location: Site 1112 is 3 miles south of Odizen Lake. Proposed highway and pipeline routes are 1 1/2 and 3 miles south-west respectively.

Material: Shale.

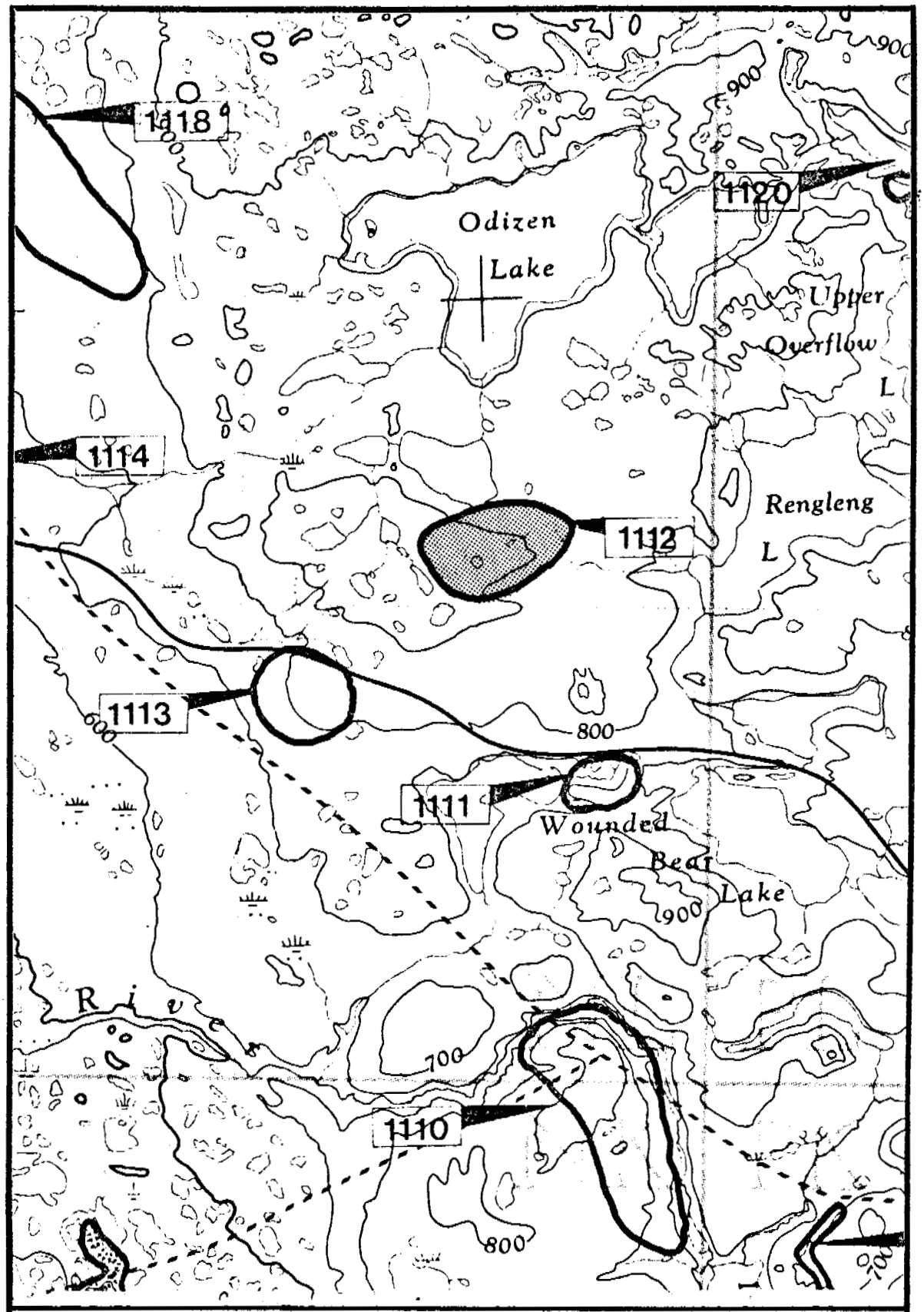
Assessment: Overburden consisting of peat, sandy, silty clay and wet weathered shale ranging up to 20 feet thick overlies the shale borrow at site 1112. Moisture contents of the overburden tend to be high as is the moisture content of the proposed shale borrow material. Access to the site crosses thermally sensitive terrain but haulage distance is reasonable. The site has a low environmental sensitivity rating. In



□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A22964-46 SCALE: 1" = 3000' (approx.)

view of the high moisture content of the shale bedrock and questionable quality of material site 1112 is <u>not</u> recommended for development.



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: ARTIC RED RIVER 106-N

SCALE: 1:125,000

SITE 1112

ENVIRONMENTAL SENSITIVITY INDEX

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	TERRAIN 1 (2) 3 4 5 Rating: 10	Formation Stability Ice Content	Flat Land, Terrace, Knoll, Rolling, Outcrop, Ridge, Scarp, Overburden Type & Depth, Wet Site, Dry Site.
5	VEGETATION 1 2 (3) 4 5 Rating: 15	Aesthetic Value Habitat Value	Marsh Black Spruce Muskeg White Spruce Mixed Conifer Conifer - Deciduous Deciduous Dry Slopes Riparian
15	MAMMALS 1 2 (3) 4 5 Rating: 45	Ungulates Furbearers Carnivores Small Mammals	Winter Range, Summer Range, Migration Route, Denning Area, Dams and Lodges, Special Habitat Use.
10	BIRDS 1 (2) 3 4 5 Rating: 20	Waterfowl-Swans, Geese, Ducks Game Birds Raptors Shorebirds Passerine	Migration Pathway, Moulting, Spring Staging, Fall Staging, Nesting-Brooding, Perching, Winter Habitat.
10	FISHERY (1) 2 3 4 5 Rating: 10	Lakes, Tributaries Mackenzie River: Whitefish, Smelt Grayling, Sculpin Pike, Goldeye Trout-Perch, Chub Lake Trout, Dace Burbot, Walleye Suckers, Char Stickleback, Cisco	Spawning, Nursery, Feeding, Overwintering. Major Migration Route. Siltation of Spawning Areas, Benthic Communities. Toxic Material Spill. Slumps, Velocity Increments, Migration Barriers. Eutrophication. Blasting.

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	ARCHAEOLOGY (1) 2 3 4 5 Rating: 5	Paleontology Pre-Historic Historic	Probability of Discovery. Low, Medium, High. Known Sites.
10	AESTHETICS (1) 2 3 4 5 Rating: 10	Visible from: Physical Disturbance	River, Highway, Air. Dust, Waste, Stockpiles. Noises.
15	RESOURCE UTILIZATION (1) 2 3 4 5 Rating: 15	Fort Good Hope Arctic Red R. Inuvik	Improved Access. Traplines. Hunting. Fishing. Domestic. Commercial.
15	ASSOCIATED DISTURBANCES 1 (2) 3 4 5 Rating: 30	Access Roads Miles From Highway Miles From Pipeline Hydrologic Alterations Continued Use For Maintenance.	0-2, 2-5, 5-10, 10+ 0-2, 2-5, 5-10, 10+ Cuts and Fills. Creek Crossings. Compaction, Slumping, Erosion. Stockpiles, Waste, Dust.
10	RESTORATION 1 (2) 3 4 5 Rating: 20	Soil Stabilization Visual Improvement Habitat Replacement	Natural Regeneration. Grass-Legume Seeding. Transplants. Sustained Maintenance. Erosion Control Systems.

R.I.R. - Relative Importance Units - Base of 100 units.

NOTE: SENSITIVITY INDEX RANGE

MINIMAL SENSITIVITY		MAXIMUM SENSITIVITY
100	TO	500

TOTAL INDEX: 180

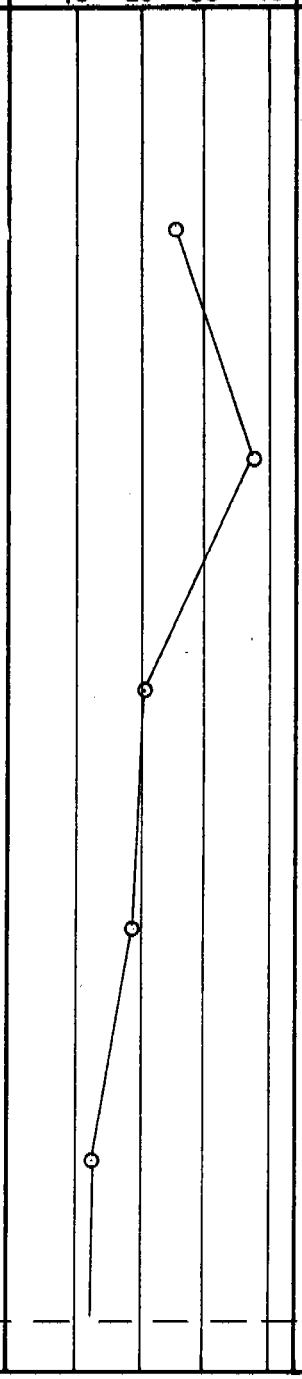
SPECIAL CONCERNS: Upland area. Drainage maintenance may be required.

F.F. SLANEY & COMPANY LIMITED
VANCOUVER, B. C.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1112 HOLE NO. 1 PAGE 1 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION
1	PT-OH	PEAT organic soil	
2			
3			
4	CI	CLAY -sandy silty -till -wet on thawing	
5			
6			
7			
8		SHALE soft -silty clay to 10 - 12' -dry to damp	
9			
10			
11			
12			
13			
14			
15			
16			
17			



DATE DRILLED: June /73 | LOGGED BY: DPW 7 | COMPLETION DEPTH: 30'

DRILLING METHOD: HELI | THAW DEPTH: N/A

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1112 HOLE NO. 1 PAGE 2 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
18		SHALE -soft			18
19					19
20		-dry to damp			20
21					21
22					22
23					23
24					24
25					25
26					26
27					27
28					28
29					29
30					30
31					31
32					32
33					33
34					34

DATE DRILLED: June /73 LOGGED BY: DPW 7 COMPLETION DEPTH: 30'

DRILLING METHOD: HELI THAW DEPTH: N/A

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

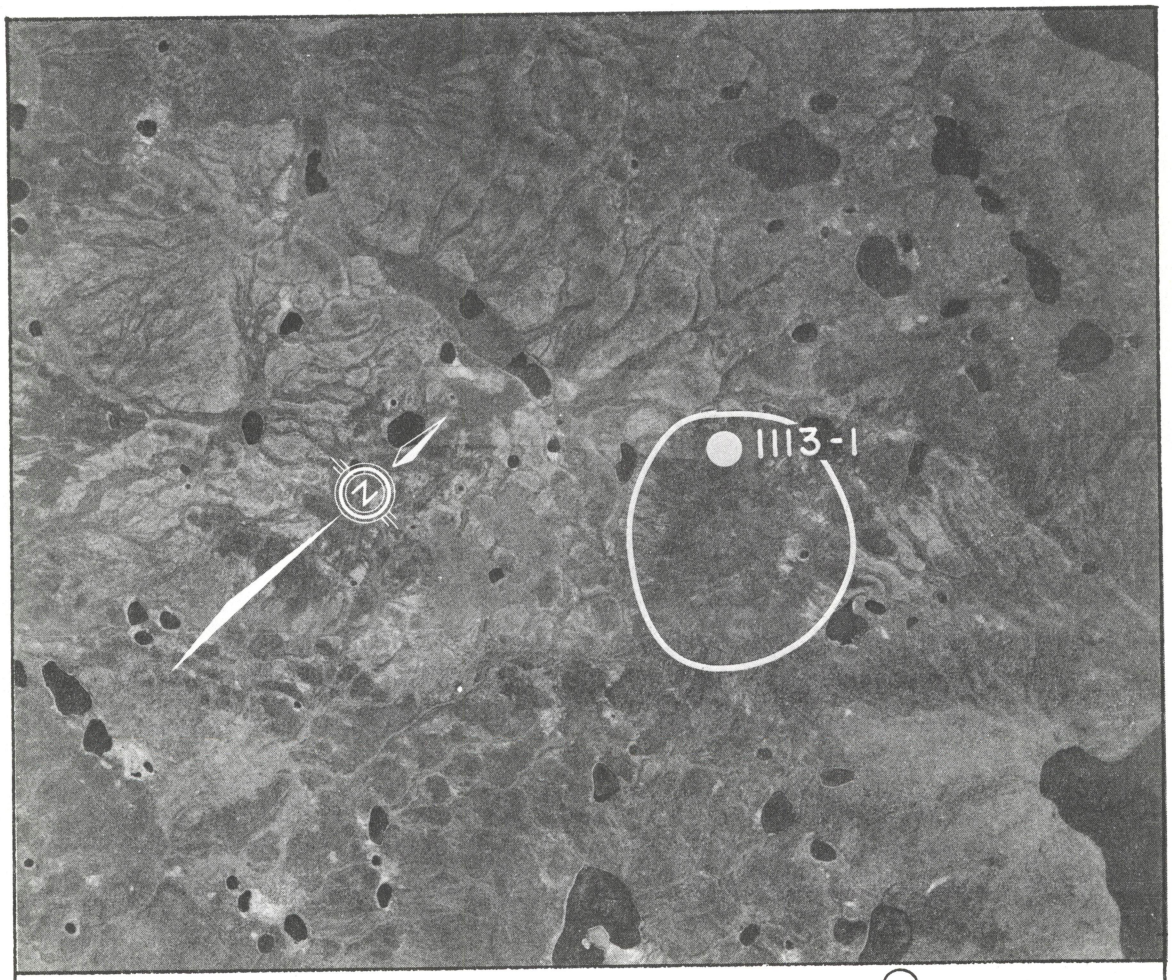
EBA Engineering Consultants Ltd.

SITE 1113a

Location: Site 1113 is 5 miles south of Odizen Lake. Proposed pipeline and highway routes border along the edges of the site.

Material: Shale.

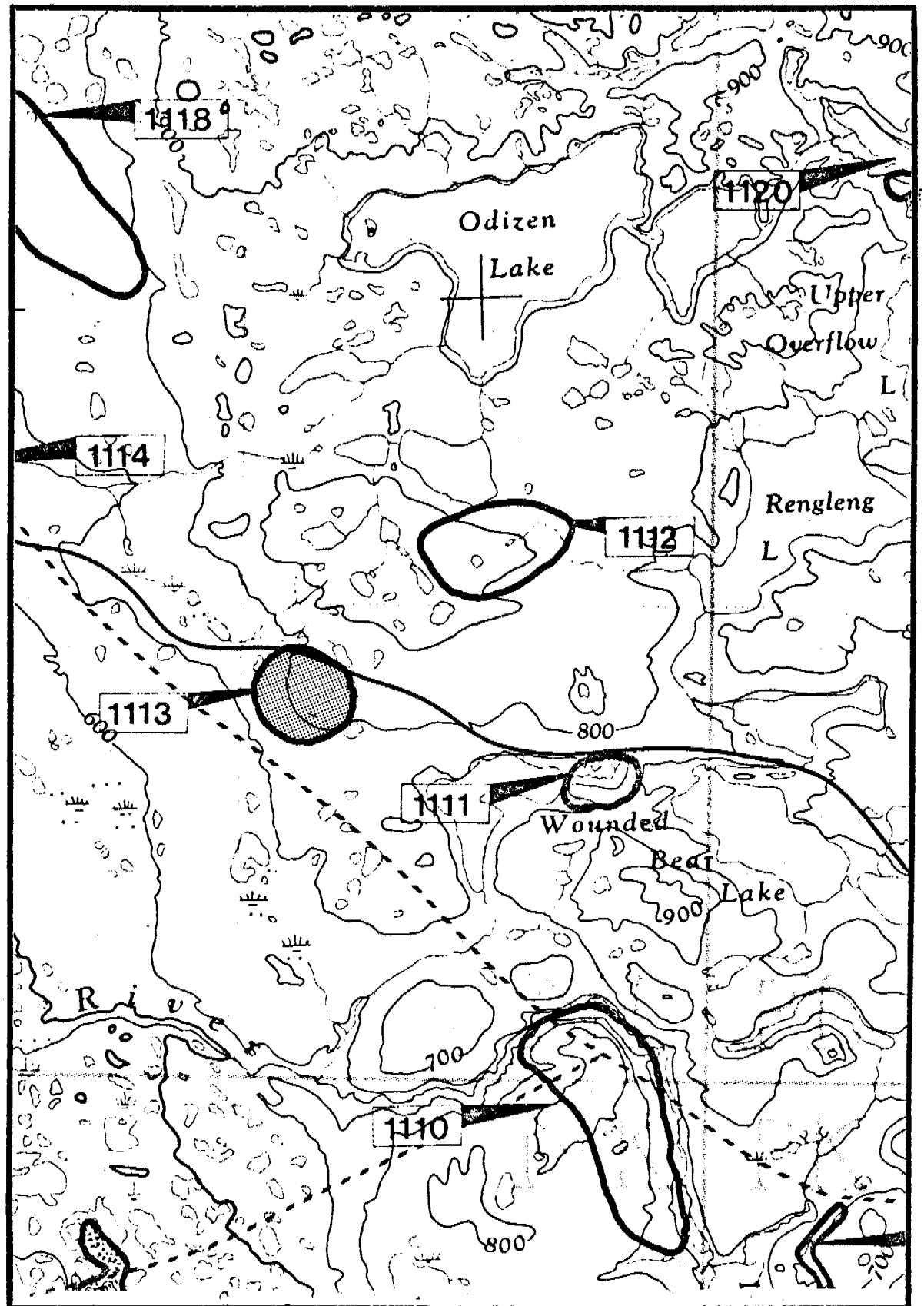
Assessment: Frozen sandy, silty clay overburden 18 ft. thick including a 3 foot thick ice layer just below the surface, covers the shale at site 1113. Permafrost was encountered just below the surface. The ground at the site is exceedingly thermally sensitive which will



□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A21584-49 SCALE: 1" = 3000' (approx.)

present some development problems especially with respect to drainage and slope stability. Moreover, the shale possesses a relatively high moisture content at depth thus its use as a construction material is questionable. Site 1113 is not recommended for development.



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: ARTIC RED RIVER 106-N

SCALE: 1:125,000

SITE 1113

ENVIRONMENTAL SENSITIVITY INDEX

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	TERRAIN (1) 2 3 4 5 Rating: 5	Formation Stability Ice Content	Flat Land, Terrace, Knoll, Rolling, Outcrop, Ridge, Scarp, Overburden Type & Depth, Wet Site, Dry Site.
5	VEGETATION 1 (2) 3 4 5 Rating: 10	Aesthetic Value Habitat Value	Marsh Black Spruce Muskeg White Spruce Mixed Conifer Conifer - Deciduous Deciduous Dry Slopes Riparian
15	MAMMALS 1 (2) 3 4 5 Rating: 30	Ungulates Furbearers Carnivores Small Mammals	Winter Range, Summer Range, Migration Route, Denning Area, Dams and Lodges, Special Habitat Use.
10	BIRDS 1 (2) 3 4 5 Rating: 20	Waterfowl-Swans, Geese, Ducks Game Birds Raptors Shorebirds Passerine	Migration Pathway, Moulting, Spring Staging, Fall Staging, Nesting-Brooding, Perching, Winter Habitat.
10	FISHERY (1) 2 3 4 5 Rating: 10	Lakes, Tributaries Mackenzie River: Whitefish, Smelt Grayling, Sculpin Pike, Goldeye Trout-Perch, Chub Lake Trout, Dace Burbot, Walleye Suckers, Char Stickleback, Cisco	Spawning, Nursery, Feeding, Overwintering. Major Migration Route. Siltation of Spawning Areas, Benthic Communities. Toxic Material Spill. Slumps, Velocity Increments, Migration Barriers. Eutrophication. Blasting.

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	ARCHAEOLOGY (1) 2 3 4 5 Rating: 5	Paleontology Pre-Historic Historic	Probability of Discovery. Low, Medium, High. Known Sites.
10	AESTHETICS 1 2 3 4 (5) Rating: 50	Visible from: Physical Disturbance	River, Highway, Air. Dust, Waste, Stockpiles, Noises.
15	RESOURCE UTILIZATION (1) 2 3 4 5 Rating: 15	Fort Good Hope Arctic Red R. Inuvik	Improved Access. Traplines. Hunting. Fishing. Domestic. Commercial.
15	ASSOCIATED DISTURBANCES (1) 2 3 4 5 Rating: 15	Access Roads Miles From Highway Miles From Pipeline Hydrologic Alterations Continued Use For Maintenance.	0-2, 2-5, 5-10, 10+ 0-2, 2-5, 5-10, 10+ Cuts and Fills. Creek Crossings. Compaction. Slumping, Erosion. Stockpiles, Waste, Dust.
10	RESTORATION 1 2 3 4 (5) Rating: 50	Soil Stabilization Visual Improvement Habitat Replacement	Natural Regeneration. Grass-Legume Seeding. Transplants. Sustained Maintenance. Erosion Control Systems.

NOTE: SENSITIVITY INDEX RANGE

MINIMAL SENSITIVITY		MAXIMUM SENSITIVITY
100	TO	500

R.I.R. - Relative Importance Units - Base of 100 units.

TOTAL INDEX: 210

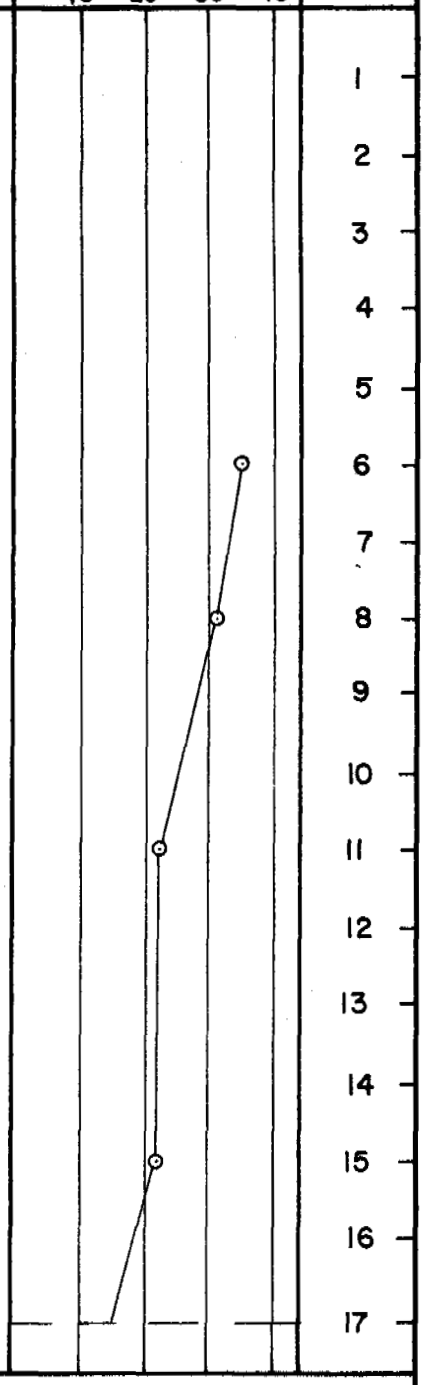
SPECIAL CONCERNS: Upland area, visible from highway. Buffer zones and visual restoration may be required.

F.F. SLANEY & COMPANY LIMITED
VANCOUVER, B. C.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1113 HOLE NO. 1 PAGE 1 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION
1	PT	ORGANIC MATERIAL	
2			
3			
4		ICE	
5			
6			
7	CI	CLAY sandy silty	Vs
8		-wet zones on thawing	
9			Vr
10			
11			
12			
13			
14			
15			
16			
17			



DATE DRILLED: June /73 LOGGED BY: DPW 67 COMPLETION DEPTH: 25'

DRILLING METHOD: HELI THAW DEPTH: N/A

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY - STAGE III

SITE NO. 1113 HOLE NO. 1 PAGE 2 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
	CI	CLAY			
18					18
19					19
20	br	SHALE -soft to hard			20
21					21
22					22
23					23
24					24
25					25
26					26
27					27
28					28
29					29
30					30
31					31
32					32
33					33
34					34

DATE DRILLED: June 73 LOGGED BY: DPW 67 COMPLETION DEPTH: 25'

DRILLING METHOD: HELI THAW DEPTH: N/A

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

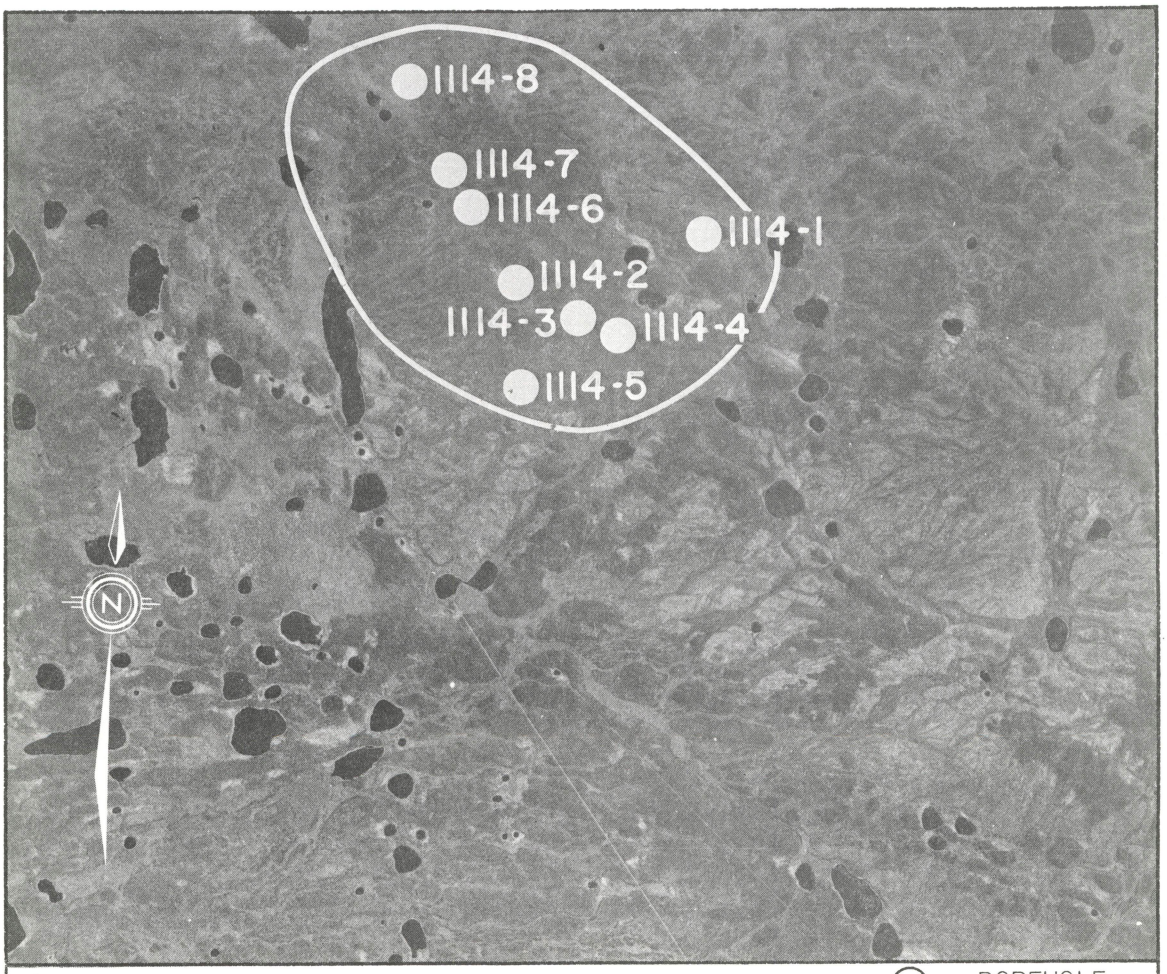
EBA Engineering Consultants Ltd.

SITE 1114a

Location: Site 1114 is situated 8 miles south-west of Odizen Lake. The proposed highway route crosses the site and the proposed pipeline route is 1/2 mile north-east of the site.

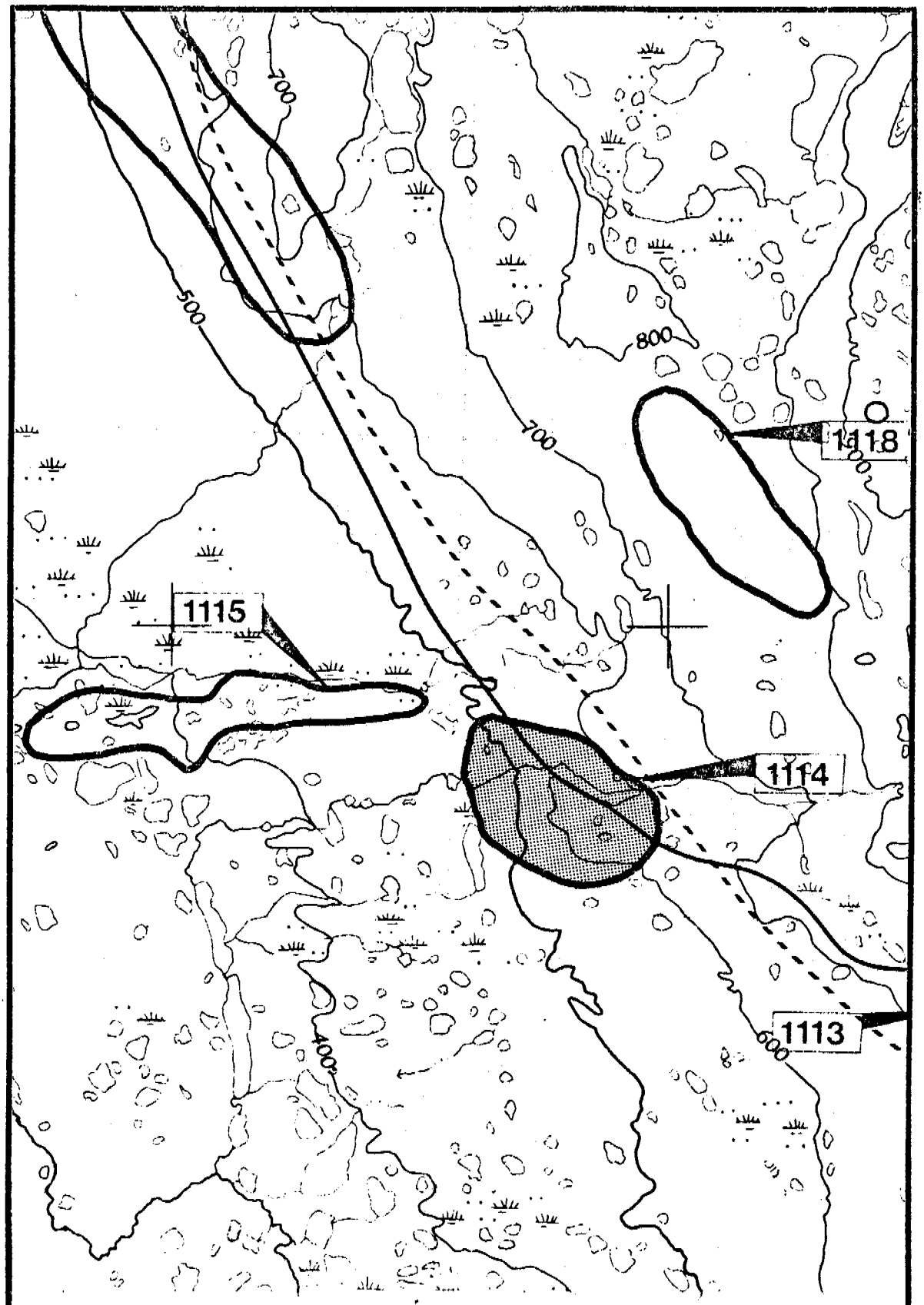
Material: Shale and siltstone.

Assessment: Wet, clayey, sandy silt and weathered shale ranging up to 20 feet thick overlies wet shale at site 1114. The shale is generally poor quality and not suitable for use in construction. Site 1114 is not recommended for development.



□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A21584-48 SCALE: 1" = 5500' (approx.)



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: ARTIC RED RIVER 106-N

SCALE: 1:125,000

SITE 1114

ENVIRONMENTAL SENSITIVITY INDEX

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	TERRAIN (1) 2 3 4 5 Rating: 5	Formation Stability Ice Content	Flat Land, Terrace, Knoll, Rolling, Outcrop, Ridge, Scarp, Overburden Type & Depth, Wet Site, Dry Site.
5	VEGETATION 1 (2) 3 4 5 Rating: 10	Aesthetic Value Habitat Value	Marsh Black Spruce Muskeg White Spruce Mixed Conifer Conifer - Deciduous Deciduous Dry Slopes Riparian
15	MAMMALS 1 (2) 3 4 5 Rating: 30	Ungulates Furbearers Carnivores Small Mammals	Winter Range, Summer Range, Migration Route, Denning Area, Dams and Lodges, Special Habitat Use.
10	BIRDS 1 (2) 3 4 5 Rating: 20	Waterfowl-Swans, Geese, Ducks Game Birds Raptors Shorebirds Passerine	Migration Pathway, Moulting, Spring Staging, Fall Staging, Nesting-Brooding, Perching, Winter Habitat.
10	FISHERY 1 (2) 3 4 5 Rating: 20	Lakes, Tributaries Mackenzie River: Whitefish, Smelt Grayling, Sculpin Pike, Goldeye Trout-Perch, Chub Lake Trout, Dace Burbot, Walleye Suckers, Char Stickleback, Cisco	Spawning, Nursery, Feeding, Overwintering. Major Migration Route. Siltation of Spawning Areas, Benthic Communities. Toxic Material Spill. Slumps, Velocity Increments, Migration Barriers. Eutrophication. Blasting.

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	ARCHAEOLOGY (1) 2 3 4 5 Rating: 5	Paleontology Pre-Historic Historic	Probability of Discovery. Low, Medium, High. Known Sites.
10	AESTHETICS 1 2 3 4 (5) Rating: 50	Visible from: Physical Disturbance	River, Highway, Air. Dust, Waste, Stockpiles, Noises.
15	RESOURCE UTILIZATION 1 (2) 3 4 5 Rating: 30	Fort Good Hope Arctic Red R. Inuvik	Improved Access. Traplines. Hunting. Fishing. Domestic. Commercial.
15	ASSOCIATED DISTURBANCES (1) 2 3 4 5 Rating: 15	Access Roads Miles From Highway Miles From Pipeline Hydrologic Alterations Continued Use For Maintenance.	0-2, 2-5, 5-10, 10+ 0-2, 2-5, 5-10, 10+ Cuts and Fills, Creek Crossings, Compaction, Slumping, Erosion. Stockpiles, Waste, Dust.
10	RESTORATION 1 2 3 4 (5) Rating: 50	Soil Stabilization Visual Improvement Habitat Replacement	Natural Regeneration. Grass-Legume Seeding. Transplants. Sustained Maintenance. Erosion Control Systems.

R.I.R. - Relative Importance Units - Base of 100 units.

NOTE: SENSITIVITY INDEX RANGE

MINIMAL SENSITIVITY		MAXIMUM SENSITIVITY
100	TO	500

TOTAL INDEX: 235

SPECIAL CONCERNS: Upland area visible from highway. Buffer zones, restoration procedures and drainage maintenance may be required.

F.F. SLANEY & COMPANY LIMITED
VANCOUVER, B. C.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1114 HOLE NO. 1 PAGE 1 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
1	OH-CI	CLAY SILT WITH ORGANIC MATERIAL			1
2					2
3					3
4	br	SANDSTONE OR SILTSTONE	Nf		4
5		-dry			5
6					6
7					7
8					8
9					9
10					10
11					11
12					12
13					13
14					14
15					15
16					16
17					17

DATE DRILLED: June /73 LOGGED BY: DPW 70 COMPLETION DEPTH: 30'

DRILLING METHOD: HELI THAW DEPTH: N/A

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY - STAGE III

SITE NO. 1114 HOLE NO. 1 PAGE 2 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
18		SANDSTONE OR SILTSTONE -dry			18
19			Nf		19
20					20
21					21
22					22
23					23
24					24
25					25
26					26
27					27
28					28
29					29
30					30
31					31
32					32
33					33
34					34

DATE DRILLED: June /73 LOGGED BY: DPW 70 COMPLETION DEPTH: 30'

DRILLING METHOD: HELI THAW DEPTH: N/A

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1114 HOLE NO. 2 PAGE 1 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
1		ORGANICS			1
2					2
3		SHALE clay and weathered			3
4					4
5					5
6					6
7					7
8					8
9					9
10					10
11		SHALE clay and weathered			11
12					12
13					13
14		ICE			14
15		CLAY AND SHALE			15
16					16
17					17

DATE DRILLED: Sept./73 LOGGED BY: DPW 150 COMPLETION DEPTH: 20'

DRILLING METHOD: THAW DEPTH:

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1114 HOLE NO. 2 PAGE 2 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
18		CLAY - SHALE grey			18
19					19
20					20
21					21
22					22
23					23
24					24
25					25
26					26
27					27
28					28
29					29
30					30
31					31
32					32
33					33
34					34

DATE DRILLED: Sept./73 LOGGED BY: DPW 150 COMPLETION DEPTH: 20'

DRILLING METHOD: THAW DEPTH:

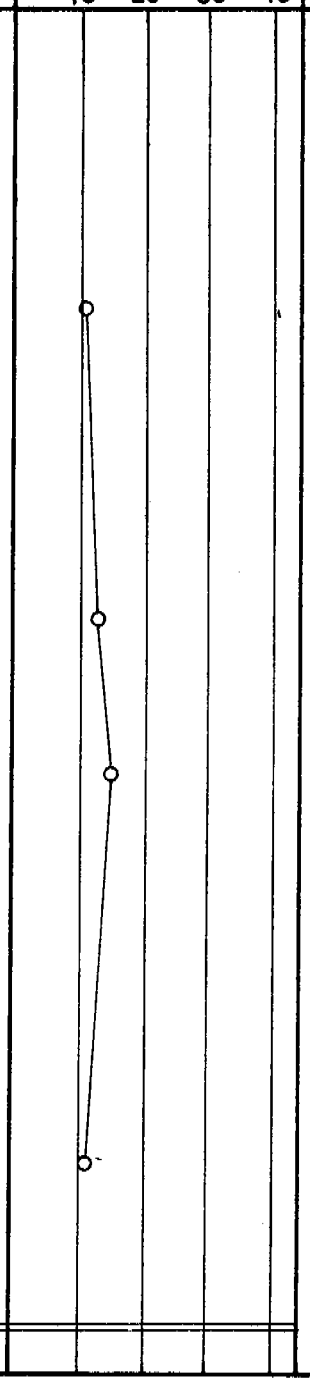
GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY - STAGE III

SITE NO. 1114 HOLE NO. 3 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
1		SHALE clayey, sandy, brown, weathered			1
2					2
3					3
4		SHALE clayey, brown			4
5					5
6					6
7					7
8					8
9		SHALE clayey, sandy, brown			9
10					10
11					11
12					12
13					13
14		SHALE silty, brown			14
15					15
16					16
17					17



DATE DRILLED: Sept./73 LOGGED BY: DPW 151 COMPLETION DEPTH: 17'

DRILLING METHOD: THAW DEPTH:

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1114 HOLE NO. 4 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
1					1
2		SHALE			2
3		clayey, sandy			3
4					4
5		GRAVEL clay-shale mixture			5
6					6
7		brown clayey			7
8					8
9					9
10					10
11					11
12					12
13					13
14					14
15					15
16					16
17					17

DATE DRILLED: Sept./73 LOGGED BY: DPW 152 COMPLETION DEPTH: 14'

DRILLING METHOD: THAW DEPTH:

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1114 HOLE NO. 5 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
1					1
2					2
3		SILT			3
4					4
5					5
6					6
7					7
8		SILT clayey, sandy, grey			8
9					9
10					10
11					11
12					12
13					13
14					14
15					15
16					16
17					17

DATE DRILLED: Sept./73 LOGGED BY: DPW 157 COMPLETION DEPTH: 10'

DRILLING METHOD: THAW DEPTH:

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY - STAGE III

SITE NO. 1114 HOLE NO. 6 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
1					1
2		CLAY brown, sandy, silty			2
3					3
4					4
5					5
6					6
7		CLAY-SHALE MIXTURE brown			7
8					8
9					9
10					10
11					11
12					12
13					13
14					14
15					15
16					16
17					17

DATE DRILLED: Sept./73 LOGGED BY: DPW 159 COMPLETION DEPTH: 9'

DRILLING METHOD: THAW DEPTH:

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1114 HOLE NO. 7 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
		ORGANICS			
1					1
2		SILT, ORGANICS			2
3					3
4		SILT clayey, sandy			4
5					5
6					6
7		SHALE silty			7
8					8
9					9
10					10
11					11
12					12
13					13
14					14
15					15
16					16
17					17

DATE DRILLED: Sept./73 LOGGED BY: DPW 160 COMPLETION DEPTH: 10'

DRILLING METHOD: THAW DEPTH:

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY - STAGE III

SITE NO. 1114 HOLE NO. 8 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
1		ORGANICS			1
2					2
3					3
4		SILT clayey, grey			4
5				o	5
6					6
7					7
8					8
9					9
10					10
11					11
12					12
13					13
14					14
15					15
16					16
17					17

DATE DRILLED: Sept./73 LOGGED BY: DPW 167 COMPLETION DEPTH: 10'

DRILLING METHOD: THAW DEPTH:

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

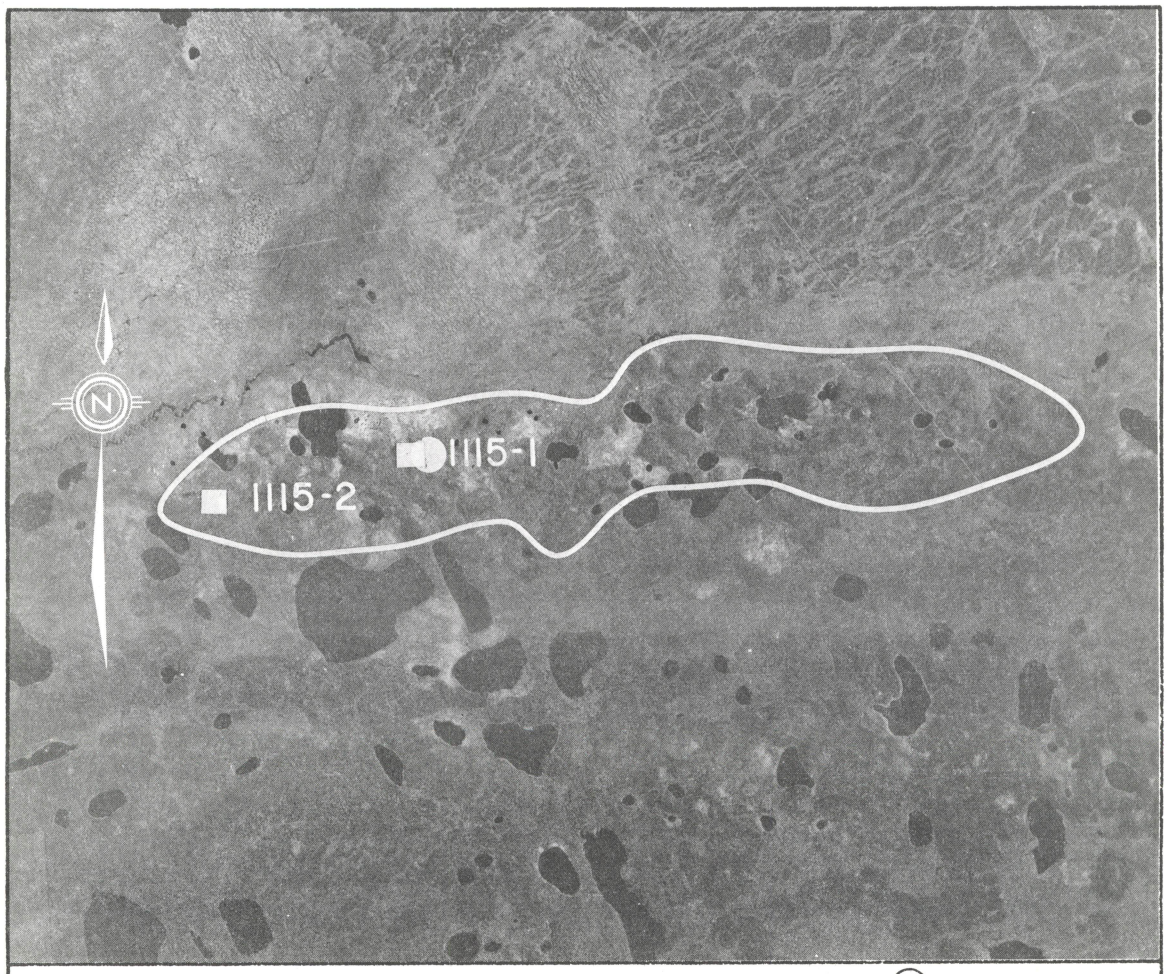
EBA Engineering Consultants Ltd.

SITE 1115

Location: Site 1115 is located 7 miles north of Beaver Lake and 11 miles west of Odizen Lake. Proposed pipeline and highway routes are 6 and 4 1/2 miles north-east of the site respectively.

Material: Sand, weathered bedrock (residual soil).

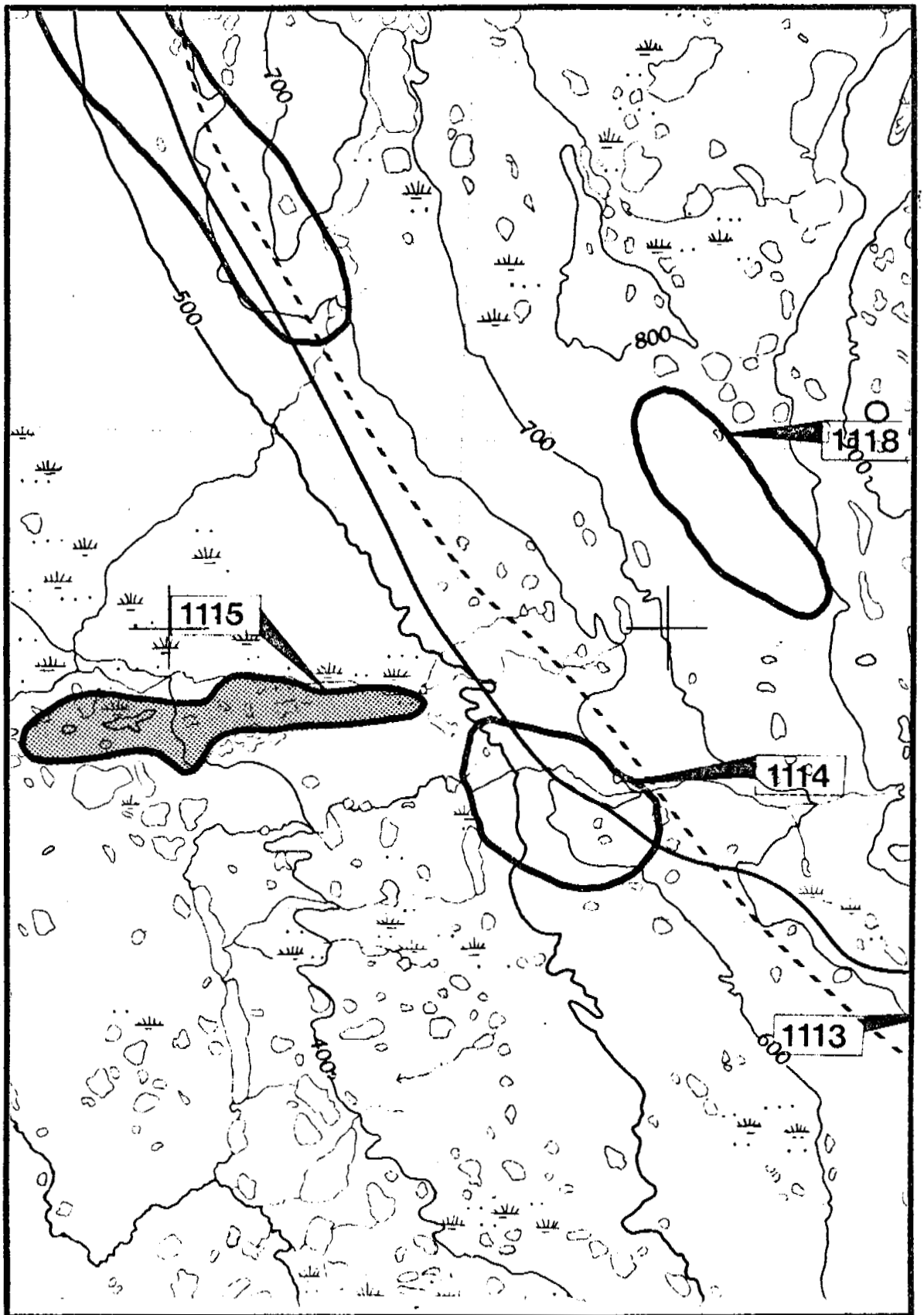
Drainage: The site is well drained.



□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A21584-7 SCALE: 1" = 5500' (approx.)

Assessment: Preliminary data indicate that a large volume of fair to good quality borrow can be obtained from site 1115. Further drilling should be undertaken at this site to delimit the bedrock outcrop and obtain overburden information. The sand and sandstone were found to be dry and unfrozen to a depth of at least 15 feet which will simplify excavation and placement during winter construction. The site is located at the fringe of reasonable haulage distance and access routes will cross thermally sensitive terrain, thereby necessitating winter operations. The site has a low environmental sensitivity rating. Site 1115 has a promising potential as a source of bedrock borrow material.



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: ARTIC RED RIVER 106-N

SCALE: 1:125,000

SITE 1115

ENVIRONMENTAL SENSITIVITY INDEX

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	TERRAIN 1 2 (3) 4 5 Rating: 15	Formation Stability Ice Content	Flat Land, Terrace, Knoll, Rolling, Outcrop, Ridge, Scarp, Overburden Type & Depth, Wet Site, Dry Site.
5	VEGETATION 1 (2) 3 4 5 Rating: 10	Aesthetic Value Habitat Value	Marsh Black Spruce Muskeg White Spruce Mixed Conifer Conifer - Deciduous Deciduous Dry Slopes Riparian
15	MAMMALS 1 (2) 3 4 5 Rating: 30	Ungulates Furbearers Carnivores Small Mammals	Winter Range, Summer Range, Migration Route, Denning Area, Dams and Lodges, Special Habitat Use.
10	BIRDS 1 (2) 3 4 5 Rating: 20	Waterfowl-Swans, Geese, Ducks Game Birds Raptors Shorebirds Passerine	Migration Pathway, Moulting, Spring Staging, Fall Staging, Nesting-Brooding, Perching, Winter Habitat.
10	FISHERY 1 2 (3) 4 5 Rating: 30	Lakes, Tributaries Mackenzie River: Whitefish, Smelt Grayling, Sculpin Pike, Goldeye Trout-Perch, Chub Lake Trout, Dace Burbot, Walleye Suckers, Char Stickleback, Cisco	Spawning, Nursery, Feeding, Overwintering. Major Migration Route. Siltation of Spawning Areas, Benthic Communities. Toxic Material Spill. Slumps, Velocity Increments, Migration Barriers. Eutrophication. Blasting.

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	ARCHAEOLOGY (1) 2 3 4 5 Rating: 5	Paleontology Pre-Historic Historic	Probability of Discovery. Low, Medium, High. Known Sites.
10	AESTHETICS (1) 2 3 4 5 Rating: 10	Visible from: Physical Disturbance	River, Highway, Air. Dust, Waste, Stockpiles, Noises.
15	RESOURCE UTILIZATION 1 (2) 3 4 5 Rating: 30	Fort Good Hope Arctic Red R. Inuvik	Improved Access. Traplines. Hunting. Fishing. Domestic. Commercial.
15	ASSOCIATED DISTURBANCES 1 2 (3) 4 5 Rating: 45	Access Roads Miles From Highway Miles From Pipeline Hydrologic Alterations Continued Use For Maintenance.	0-2, 2-5, 5-10, 10+ 0-2, 2-5, 5-10, 10+ Cuts and Fills. Creek Crossings. Compaction. Slumping, Erosion. Stockpiles, Waste, Dust.
10	RESTORATION (1) 2 3 4 5 Rating: 10	Soil Stabilization Visual Improvement Habitat Replacement	Natural Regeneration. Grass-Legume Seeding. Transplants. Sustained Maintenance. Erosion Control Systems.

R.I.R. - Relative Importance Units - Base of 100 units.

NOTE: SENSITIVITY INDEX RANGE

MINIMAL SENSITIVITY		MAXIMUM SENSITIVITY
100	TO	500

TOTAL INDEX: 205

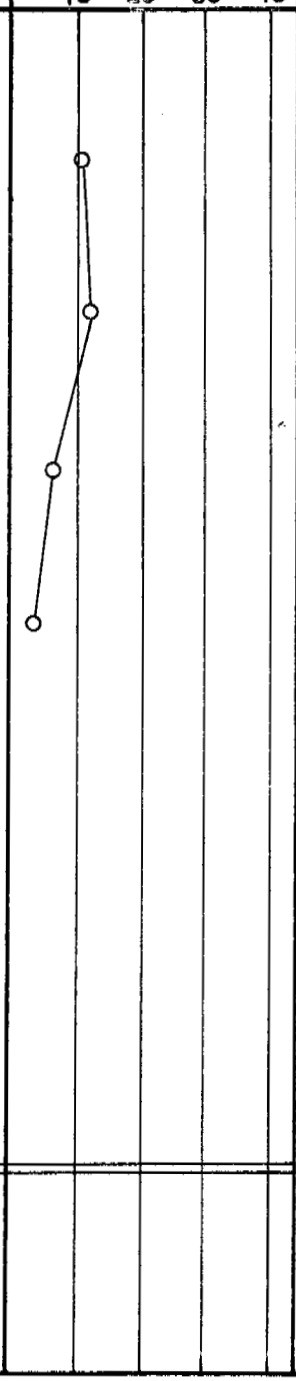
SPECIAL CONCERNS: On tributary to Rengleng River

F.F. SLANEY & COMPANY LIMITED
VANCOUVER, B. C.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1115 HOLE NO. 1 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION
1	SC	SAND, clayey -fine sand, low to medium plastic, probably highly weathered clayey sandstone, medium brown.	NOT FROZEN
2			
3			
4		-same, with small pieces of weathered bedrock	
5			
6		SANDSTONE, clayey -hard, dry, light to medium grey	
7			
8			
9			
10		-no return of cuttings. easy drilling, must be crevice in bedrock	
11			
12			
13			
14			
15			
16		END OF HOLE	
17			



DEPTH (feet): 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

DATE DRILLED: Sep. 16/73

LOGGED BY: EBA 1115-1

COMPLETION DEPTH: 15.0'

DRILLING METHOD: HELI DRILL

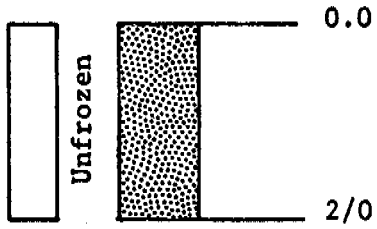
THAW DEPTH: N/A

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

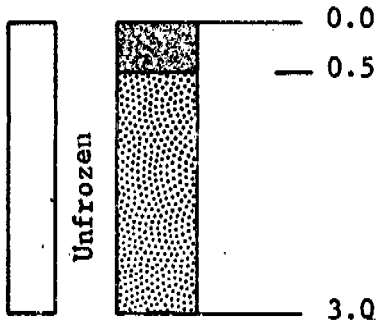
TEST PIT LOG

TP 1115-1



Weathered Sandstone, dry
light brown
rust stains

TP 1115-2



Moss

Sand, silty
dry
occassional pebbles

SITE 1116a

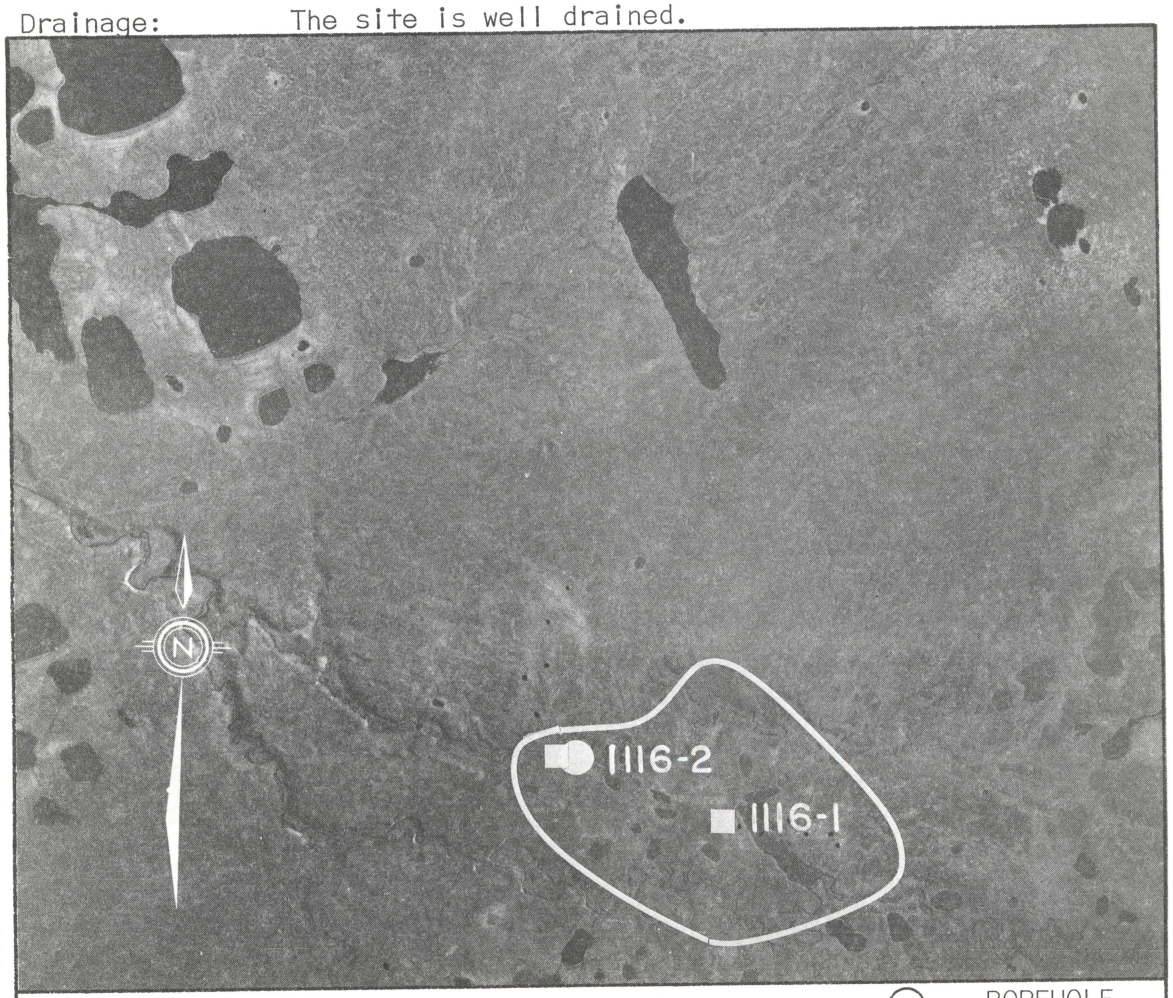
Location: Site 1116 is located 5 miles north-east of Tundra Lake on the north side of the Rengleng River. The proposed highway route is 9 miles SEE of the site. Proposed highway routes are 12 miles north-east and 13 miles south of the site, respectively.

Geology: Site 1116 is composed of a small, thin, eroding fossil terrace and small eskers.

Material: Silty, gravelly sand, well graded.

Volume: 65,000 cu. yd. in eskers, outwash volume uncertain.

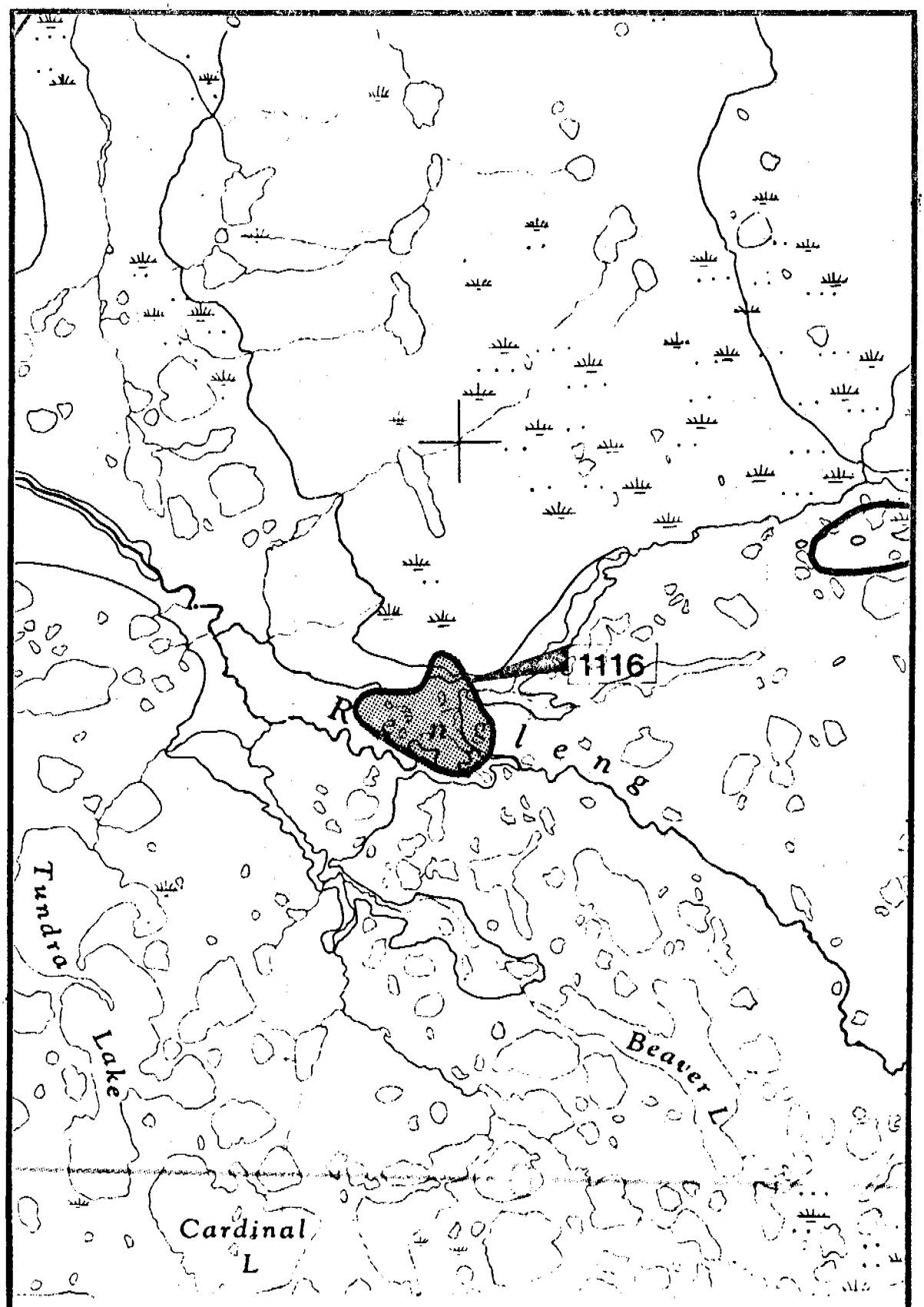
Drainage: The site is well drained.



□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A21584-9 SCALE: 1" = 3000' (approx.)

Assessment: The borrow at site 1116 is of fair quality but low volume. The site is situated at a considerable distance from proposed routes and access crosses thermally sensitive terrain. Permafrost was not encountered in boreholes to 10.5 feet. Tree cover is dense and will have to be removed. Overburden consisting of a few inches of peat or moss may be stripped during clearing and grubbing. The site has a high environmental sensitivity rating. Haulage distance and low volume of material combine to make development of site 1116 unfeasible.



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: ARTIC RED RIVER 106-N

SCALE: 1:125,000

SITE **1116**

ENVIRONMENTAL SENSITIVITY INDEX

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	TERRAIN 1 2 (3) 4 5 Rating: 15	Formation Stability Ice Content	Flat Land, Terrace, Knoll, Rolling, Outcrop, Ridge, Scarp, Overburden Type & Depth, Wet Site, Dry Site.
5	VEGETATION 1 2 (3) 4 5 Rating: 15	Aesthetic Value Habitat Value	Marsh Black Spruce Muskeg White Spruce Mixed Conifer Conifer - Deciduous Deciduous Dry Slopes Riparian
15	MAMMALS 1 2 (3) 4 5 Rating: 45	Ungulates Furbearers Carnivores Small Mammals	Winter Range, Summer Range, Migration Route, Denning Area, Dams and Lodges, Special Habitat Use.
10	BIRDS 1 2 (3) 4 5 Rating: 30	Waterfowl-Swans, Geese, Ducks Game Birds Raptors Shorebirds Passerine	Migration Pathway, Moulting, Spring Staging, Fall Staging, Nesting-Brooding, Perching, Winter Habitat.
10	FISHERY 1 2 3 4 (5) Rating: 50	Lakes, Tributaries Mackenzie River: Whitefish, Smelt Grayling, Sculpin Pike, Goldeye Trout-Perch, Chub Lake Trout, Dace Burbot, Walleye Suckers, Char Stickleback, Cisco	Spawning, Nursery, Feeding, Overwintering. Major Migration Route. Siltation of Spawning Areas, Benthic Communities. Toxic Material Spill. Slumps, Velocity Increments. Migration Barriers. Eutrophication. Blasting.

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	ARCHAEOLOGY 1 2 (3) 4 5 Rating: 15	Paleontology Pre-Historic Historic	Probability of Discovery. Low, Medium, High. Known Sites.
10	AESTHETICS (1) 2 3 4 5 Rating: 10	Visible from: Physical Disturbance	River, Highway, Air. Dust, Waste, Stockpiles. Noises.
15	RESOURCE UTILIZATION 1 2 3 4 (5) Rating: 75	Fort Good Hope Arctic Red R. Inuvik	Improved Access. Traplines. Hunting. Fishing. Domestic. Commercial.
15	ASSOCIATED DISTURBANCES 1 2 3 4 (5) Rating: 75	Access Roads Miles From Highway Miles From Pipeline Hydrologic Alterations Continued Use For Maintenance.	0-2, 2-5, 5-10, 10+ 0-2, 2-5, 5-10, 10+ Cuts and Fills. Creek Crossings. Compaction, Slumping, Erosion. Stockpiles, Waste, Dust.
10	RESTORATION 1 (2) 3 4 5 Rating: 20	Soil Stabilization Visual Improvement Habitat Replacement	Natural Regeneration. Grass-Legume Seeding. Transplants. Sustained Maintenance. Erosion Control Systems.

R.I.R. - Relative Importance Units - Base of 100 units.

NOTE: SENSITIVITY INDEX RANGE

MINIMAL SENSITIVITY		MAXIMUM SENSITIVITY
100	TO	500

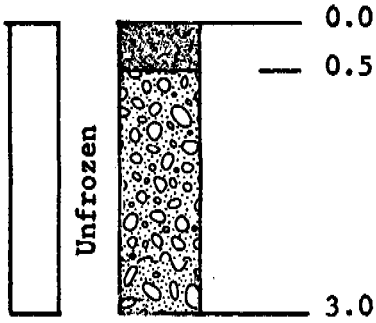
TOTAL INDEX: 350

SPECIAL CONCERNS: On tributary to Rengleng River, Recommend adequate buffer zone and fish migration passage provision within grizzly bear range.

F.F. SLANEY & COMPANY LIMITED
VANCOUVER, B. C.

TEST PIT LOG

TP 1116-1

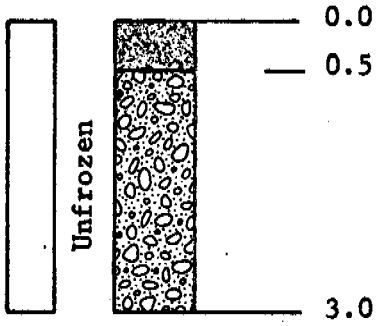


Peat

Gravel, light brown
dry

11% GRAVEL
60% SAND
29% SILT & CLAY

TP 1116-2



Moss

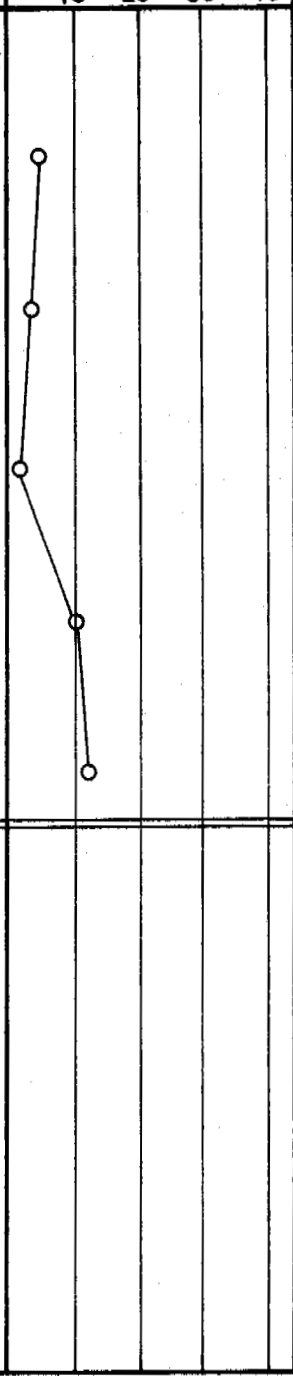
Gravel, light brown
dry

55% GRAVEL
26% SAND
19% SILT & CLAY

GRANULAR MATERIALS INVENTORY - STAGE III

SITE NO. 1116 HOLE NO. 2 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION
1	GM	GRAVEL, silty -trace to some fine to medium fine sand, gravel subangular to subrounded, maximum 1½", average 3/4", light brown.	NOT FROZEN
2			
3			
4		(4'-10') 22% GRAVEL 57% SAND 21% SILT & CLAY	
5		-very silty, medium brown	
6			
7	SM	SILT, sandy -some gravel, sand fine to medium grained, grey	
8			
9			
10		-trace of clay	
11		END OF HOLE	
12			
13			
14			
15			
16			
17			



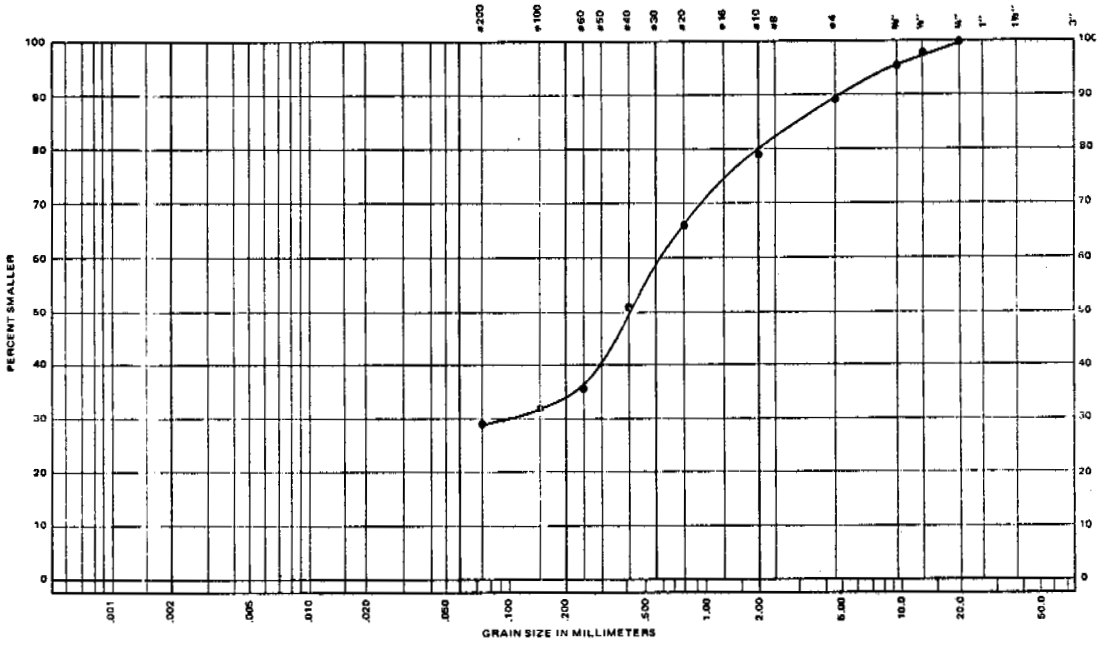
DATE DRILLED: Sep. 14/73 LOGGED BY: EBA 106-2 COMPLETION DEPTH: 10.5'

DRILLING METHOD: AUGER THAW DEPTH: N/A

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

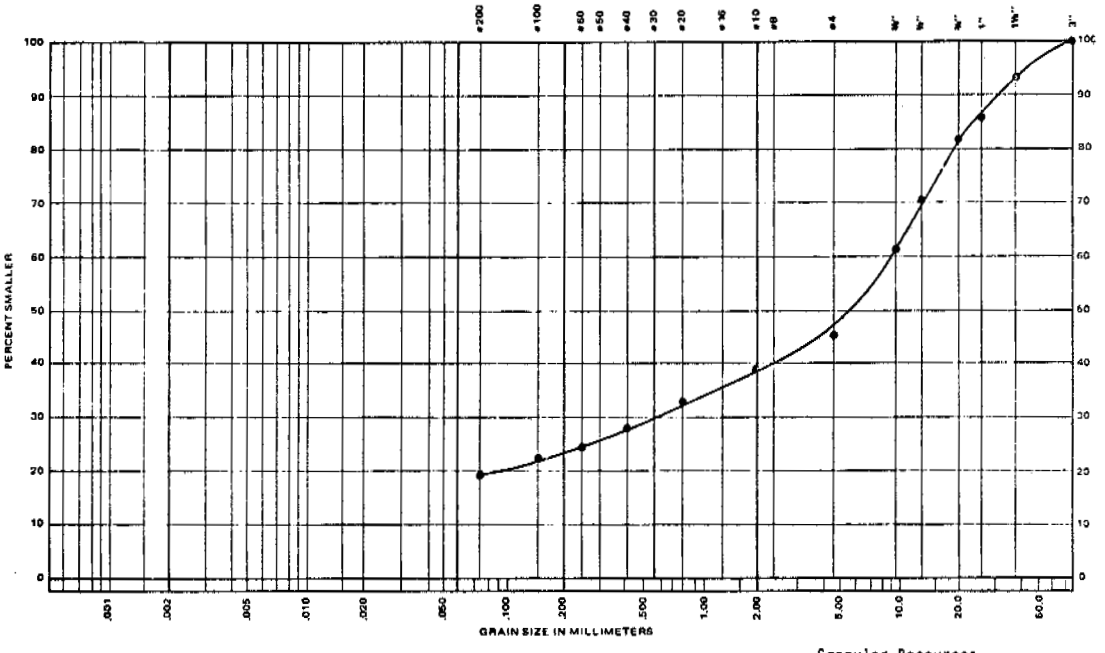


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Silty Sand and some Gravel (SM) M/C = 7.1%

PROJECT Granular Resources
JOB No. E-666 DATE
SAMPLE No. TP 1116-1
DEPTH 3'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

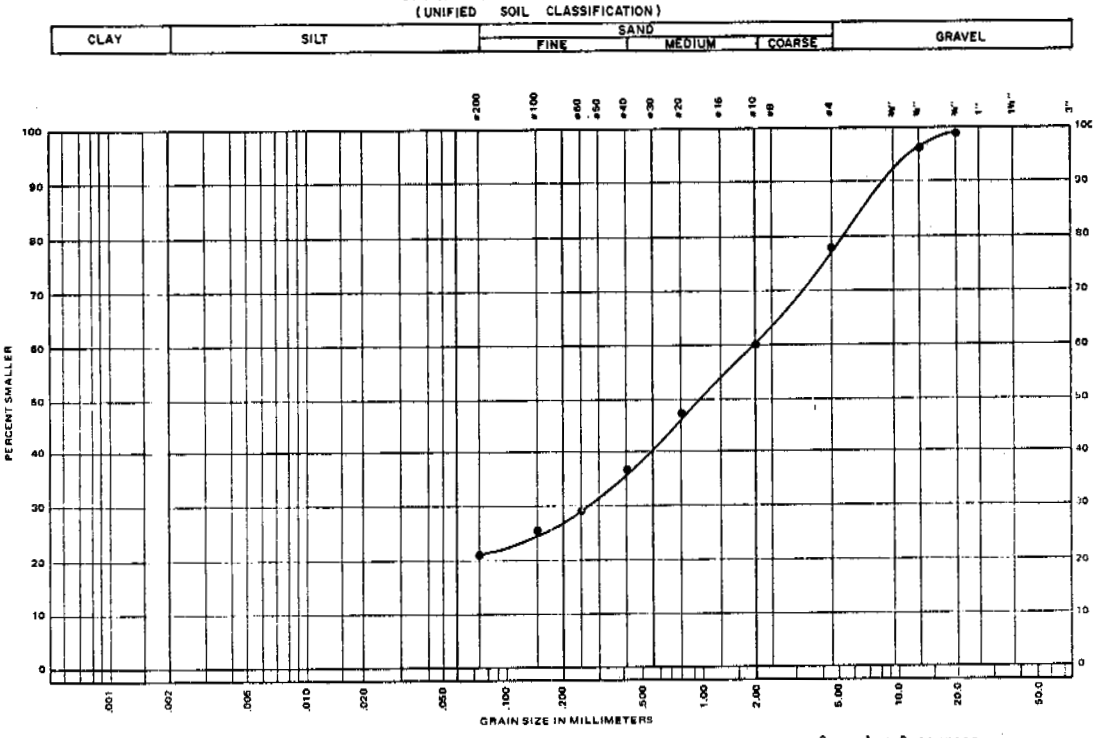


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Sandy Gravel with some Silt (GP) M/C = 3.7%

PROJECT Granular Resources
JOB No. E-666 DATE
SAMPLE No. TP 1116-2
DEPTH 3'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Silty Gravelly Sand (SM)

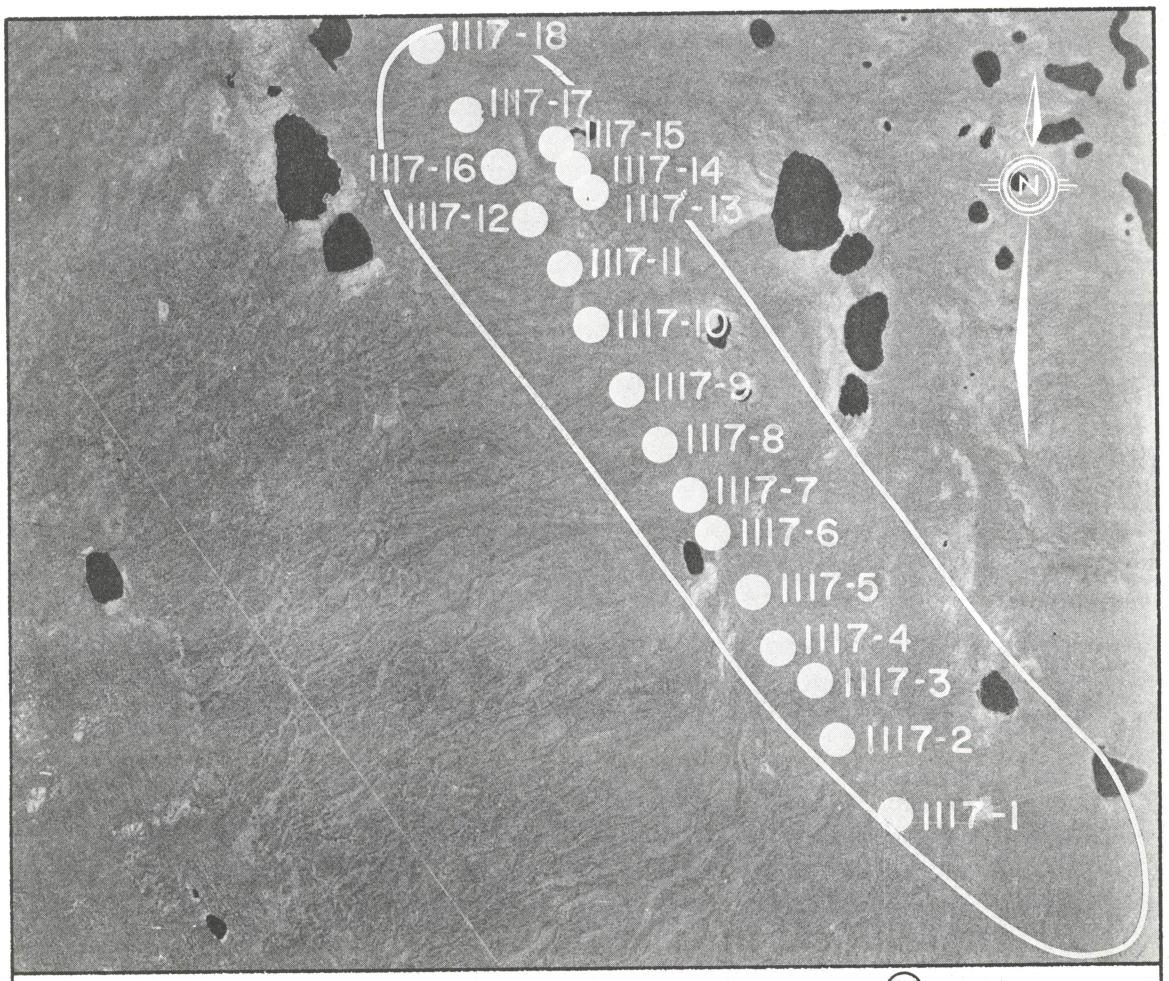
PROJECT Granular Resources
JOB No. E-666 DATE Nov. 30/73
SAMPLE No. BH 1116-2
DEPTH 4' - 10'

SITE 1117

Location: Site 1117 is a 9 mile long shale bedrock area situated approximately 11 miles south-west of Caribou Lake. Proposed highway and pipeline routes cross the site.

Material: Shale.

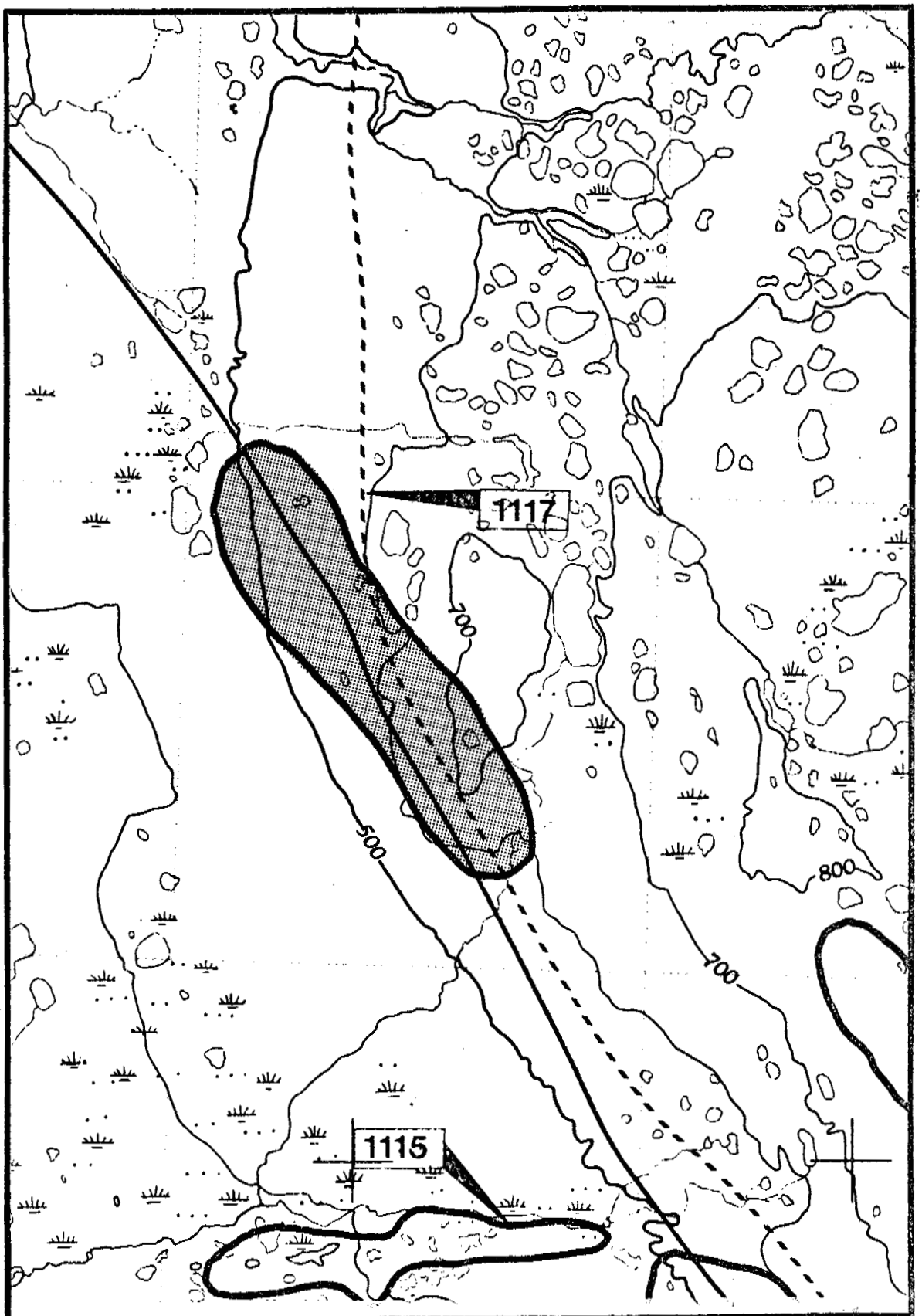
Assessment: In general the shale, which can serve as fair quality general fill, is overlain by approximately 4 to 5 feet of clayey silt overburden in the south and 10 feet at the north end of the area. The



□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A21583-140 SCALE: 1" = 5500' (approx.)

overburden can be stripped and stockpiled for use in restoration. The site encompasses thermally sensitive terrain but access will be provided by the highway and haulage distance is nominal. Moisture contents of the shale are low as is the environmental sensitivity rating. An almost unlimited volume of borrow material is available. Site 1117 is recommended for development, the south-eastern part of the site lending itself best for initial development. General quarry development guidelines are contained in this report.



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: ARTIC RED RIVER 106-N

SCALE: 1:125,000

SITE 1117

ENVIRONMENTAL SENSITIVITY INDEX

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	TERRAIN (1) 2 3 4 5 Rating: 5	Formation Stability Ice Content	Flat Land, Terrace, Knoll, Rolling, Outcrop, Ridge, Scarp, Overburden Type & Depth, Wet Site, Dry Site.
5	VEGETATION 1 (2) 3 4 5 Rating: 10	Aesthetic Value Habitat Value	Marsh Black Spruce Muskeg White Spruce Mixed Conifer Conifer - Deciduous Deciduous Dry Slopes Riparian
15	MAMMALS (1) 2 3 4 5 Rating: 15	Ungulates Furbearers Carnivores Small Mammals	Winter Range, Summer Range, Migration Route, Denning Area, Dams and Lodges, Special Habitat Use.
10	BIRDS (1) 2 3 4 5 Rating: 10	Waterfowl-Swans, Geese, Ducks Game Birds Raptors Shorebirds Passerine	Migration Pathway, Moulting, Spring Staging, Fall Staging, Nesting-Brooding, Perching, Winter Habitat.
10	FISHERY 1 (2) 3 4 5 Rating: 20	Lakes, Tributaries Mackenzie River: Whitefish / Smelt Grayling / Sculpin Pike / Goldeye Trout-Perch / Chub Lake Trout / Dace Burbot / Walleye Suckers / Char Stickleback / Cisco	Spawning, Nursery, Feeding, Overwintering. Major Migration Route. Siltation of Spawning Areas, Benthic Communities. Toxic Material Spill. Slumps, Velocity Increments, Migration Barriers. Eutrophication. Blasting.
5	ARCHAEOLOGY (1) 2 3 4 5 Rating: 5	Paleontology Pre-Historic Historic	Probability of Discovery. Low, Medium, High. Known Sites.
10	AESTHETICS 1 2 3 4 (5) Rating: 50	Visible from: Physical Disturbance	River, Highway, Air. Dust, Waste, Stockpiles. Noises.
15	RESOURCE UTILIZATION (1) 2 3 4 5 Rating: 15	Fort Good Hope Arctic Red R. Inuvik	Improved Access. Traplines. Hunting. Fishing. Domestic. Commercial.
15	ASSOCIATED DISTURBANCES (1) 2 3 4 5 Rating: 15	Access Roads Miles From Highway Miles From Pipeline Hydrologic Alterations Continued Use For Maintenance.	0-2, 2-5, 5-10, 10+ 0-2, 2-5, 5-10, 10+ Cuts and Fills. Creek Crossings. Compaction, Slumping, Erosion. Stockpiles, Waste, Dust.
10	RESTORATION 1 2 3 4 (5) Rating: 50	Soil Stabilization Visual Improvement Habitat Replacement	Natural Regeneration. Grass-Legume Seeding. Transplants. Sustained Maintenance. Erosion Control Systems.

R.I.R. - Relative Importance Units - Base of 100 units.

NOTE: SENSITIVITY INDEX RANGE

MINIMAL SENSITIVITY		MAXIMUM SENSITIVITY
100	TO	500

TOTAL INDEX: 195

SPECIAL CONCERNS: Upland area adjacent to highway location. Visual restoration and siltation controls may be required.

F.F. SLANEY & COMPANY LIMITED
VANCOUVER, B. C.

GRANULAR MATERIALS INVENTORY - STAGE III

SITE NO. 1117 HOLE NO. 1 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
1		ORGANICS			1
2					2
3		SILT AND ORGANICS			3
4					4
5		SHALE silty			5
6					6
7					7
8					8
9					9
10					10
11					11
12					12
13					13
14					14
15					15
16					16
17					17

DATE DRILLED: Sept./73 LOGGED BY: DPW 183 COMPLETION DEPTH: 10'

DRILLING METHOD: THAW DEPTH:

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1117 HOLE NO. 2 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
1		ORGANICS			1
2		SHALE & CLAY			2
3					3
4					4
5		SHALE sandy silty			5
6					6
7					7
8					8
9					9
10					10
11					11
12					12
13					13
14					14
15					15
16					16
17					17

DATE DRILLED: Sept./73 LOGGED BY: DPW 185 COMPLETION DEPTH: 10'

DRILLING METHOD: THAW DEPTH:

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY - STAGE III

SITE NO. 1117 HOLE NO. 3 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
1		ORGANICS			1
2		SILT sandy with shale			2
3					3
4					4
5					5
6					6
7					7
8		SHALE silty			8
9					9
10					10
11					11
12					12
13					13
14					14
15					15
16					16
17					17

DATE DRILLED: Sept./73 LOGGED BY: DPW 186 COMPLETION DEPTH: 10'

DRILLING METHOD: THAW DEPTH:

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1117 HOLE NO. 4 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
1		ORGANICS			1
2		SILT organic			2
3					3
4					4
5				o	5
6		SHALE silty			6
7					7
8					8
9					9
10					10
11					11
12					12
13					13
14					14
15					15
16					16
17					17

DATE DRILLED: Sept./73 LOGGED BY: DPW 187 COMPLETION DEPTH: 10'

DRILLING METHOD: THAW DEPTH:

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY - STAGE III

SITE NO. 1117 HOLE NO. 5 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
1		ORGANICS			1
2		SHALE organic, silty			2
3					3
4		SHALE silty			4
5					5
6		SHALE sandy, silty			6
7					7
8					8
9					9
10					10
11					11
12					12
13					13
14					14
15					15
16					16
17					17

DATE DRILLED: Sept./73 LOGGED BY: DPW 188 COMPLETION DEPTH: 10'

DRILLING METHOD: THAW DEPTH:

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1117 HOLE NO. 6 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
		ORGANICS			
1					1
2		ICE			2
3					3
4		SILT clayey			4
5					5
6					6
7		SHALE AND CLAY			7
8					8
9					9
10					10
11					11
12					12
13					13
14					14
15					15
16					16
17					17

DATE DRILLED: Sept./73 LOGGED BY: DPW 189 COMPLETION DEPTH: 10'

DRILLING METHOD: THAW DEPTH:

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY - STAGE III

SITE NO. 1117 HOLE NO. 7 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
1		ORGANICS			1
2		SILT organic			2
3					3
4		SHALE silty			4
5					5
6					6
7		SHALE AND CLAY			7
8					8
9					9
10					10
11					11
12					12
13					13
14					14
15					15
16					16
17					17

DATE DRILLED: Sept./73 LOGGED BY: DPW 190 COMPLETION DEPTH: 10'

DRILLING METHOD: THAW DEPTH:

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1117 HOLE NO. 8 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
		ORGANICS			
1					1
2		SHALE silty			2
3					3
4					4
5					5
6					6
7		SHALE			7
8					8
9					9
10					10
11					11
12					12
13					13
14					14
15					15
16					16
17					17

DATE DRILLED: Sept./73 LOGGED BY: DPW 191 COMPLETION DEPTH: 10'

DRILLING METHOD: THAW DEPTH:

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY - STAGE III

SITE NO. 1117 HOLE NO. 9 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
		ORGANIC			
1					1
		SILT ice & organic			
2					2
3					3
4					4
		SHALE silty			
5					5
6				o	6
7					7
8		SHALE			8
9					9
10					10
11					11
12					12
13					13
14					14
15					15
16					16
17					17

DATE DRILLED: Sept./73 LOGGED BY: DPW 192 COMPLETION DEPTH: 10'

DRILLING METHOD: THAW DEPTH:

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1117 HOLE NO. 10 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
1		ORGANIC			1
2		SHALE organic, silty			2
3					3
4					4
5		SHALE silty			5
6				o	6
7					7
8					8
9		SHALE			9
10					10
11					11
12					12
13					13
14					14
15					15
16					16
17					17

DATE DRILLED: Sept./73 LOGGED BY: DPW 193 COMPLETION DEPTH: 10'

DRILLING METHOD: THAW DEPTH:

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY - STAGE III

SITE NO. 1117 HOLE NO. 11 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
		ORGANICS			
1					1
2		SHALE silty, grey			2
3					3
4					4
5					5
6					6
7		SHALE			7
8					8
9					9
10					10
11					11
12					12
13					13
14					14
15					15
16					16
17					17

DATE DRILLED: Sept./73 LOGGED BY: DPW 194 COMPLETION DEPTH: 10'

DRILLING METHOD: THAW DEPTH:

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1117 HOLE NO. 12 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
		ORGANICS			
1					1
2		SHALE silty			2
3					3
4					4
5					5
6					6
7		SHALE			7
8					8
9					9
10					10
11					11
12					12
13					13
14					14
15					15
16					16
17					17

DATE DRILLED: Sept./73 LOGGED BY: DPW 195 COMPLETION DEPTH: 10'

DRILLING METHOD: THAW DEPTH:

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1117 HOLE NO. 13 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
1					1
2		SILT organic			2
3					3
4					4
5					5
6		SHALE clayey, soft		o	6
7					7
8					8
9					9
10					10
11					11
12					12
13					13
14					14
15					15
16					16
17					17

DATE DRILLED: Sept./73 LOGGED BY: DPW 196 COMPLETION DEPTH: 10'

DRILLING METHOD: THAW DEPTH:

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1117 HOLE NO. 14 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
		ORGANIC			
1					1
2					2
3					3
4					4
5		SHALE silty, clayey, gravelly			5
6					6
7					7
8					8
9					9
10				o	10
11					11
12					12
13					13
14					14
15					15
16					16
17					17

DATE DRILLED: Sept./73 LOGGED BY: DPW 197 COMPLETION DEPTH: 10'

DRILLING METHOD: THAW DEPTH:

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1117 HOLE NO. 15 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
		ORGANIC			
1					1
2					2
3					3
4					4
		CLAY gravelly, silty			
5					5
6					6
7					7
8					8
9					9
10					10
11					11
12					12
13					13
14					14
15					15
16					16
17					17

DATE DRILLED: Sept./73 LOGGED BY: DPW 198 COMPLETION DEPTH: 10'

DRILLING METHOD: THAW DEPTH:

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY - STAGE III

SITE NO. 1117 HOLE NO. 16 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
1		ORGANICS			1
2					2
3					3
4		SILT grey, clayey			4
5					5
6					6
7					7
8					8
9					9
10					10
11					11
12					12
13					13
14					14
15					15
16					16
17					17

DATE DRILLED: Sept./73 LOGGED BY: DPW 199 COMPLETION DEPTH: 10'

DRILLING METHOD: THAW DEPTH:

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1117 HOLE NO. 17 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
		ORGANICS			
1		ICE			1
2					2
3					3
4					4
5		SILT grey, clayey		o	5
6					6
7					7
8					8
9					9
10					10
11					11
12					12
13					13
14					14
15					15
16					16
17					17

DATE DRILLED: Sept./73 LOGGED BY: DPW 200 COMPLETION DEPTH: 10'

DRILLING METHOD: THAW DEPTH:

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1117 HOLE NO. 18 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
1		ORGANICS			1
2					2
3					3
4					4
5		SILT clayey		o	5
6					6
7					7
8					8
9					9
10					10
11					11
12					12
13					13
14					14
15					15
16					16
17					17

DATE DRILLED: Sept./73 LOGGED BY: DPW 201 COMPLETION DEPTH: 10'

DRILLING METHOD: THAW DEPTH:

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

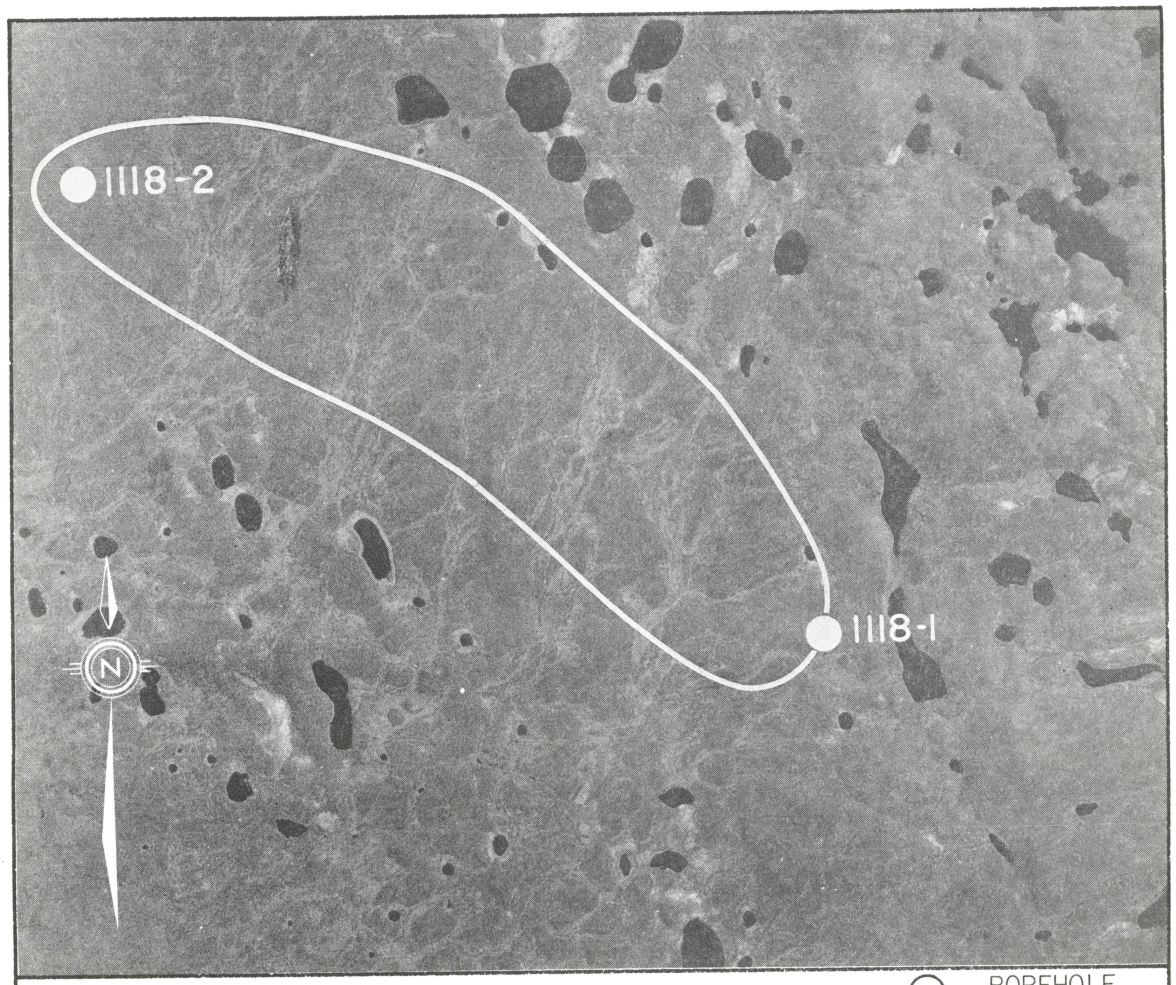
EBA Engineering Consultants Ltd.

SITE 1118

Location: Site 1118 is located 3 miles west of Odizen Lake. Proposed pipeline and highway routes are 2 1/2 and 4 miles south-west of the site respectively.

Material: Shale.

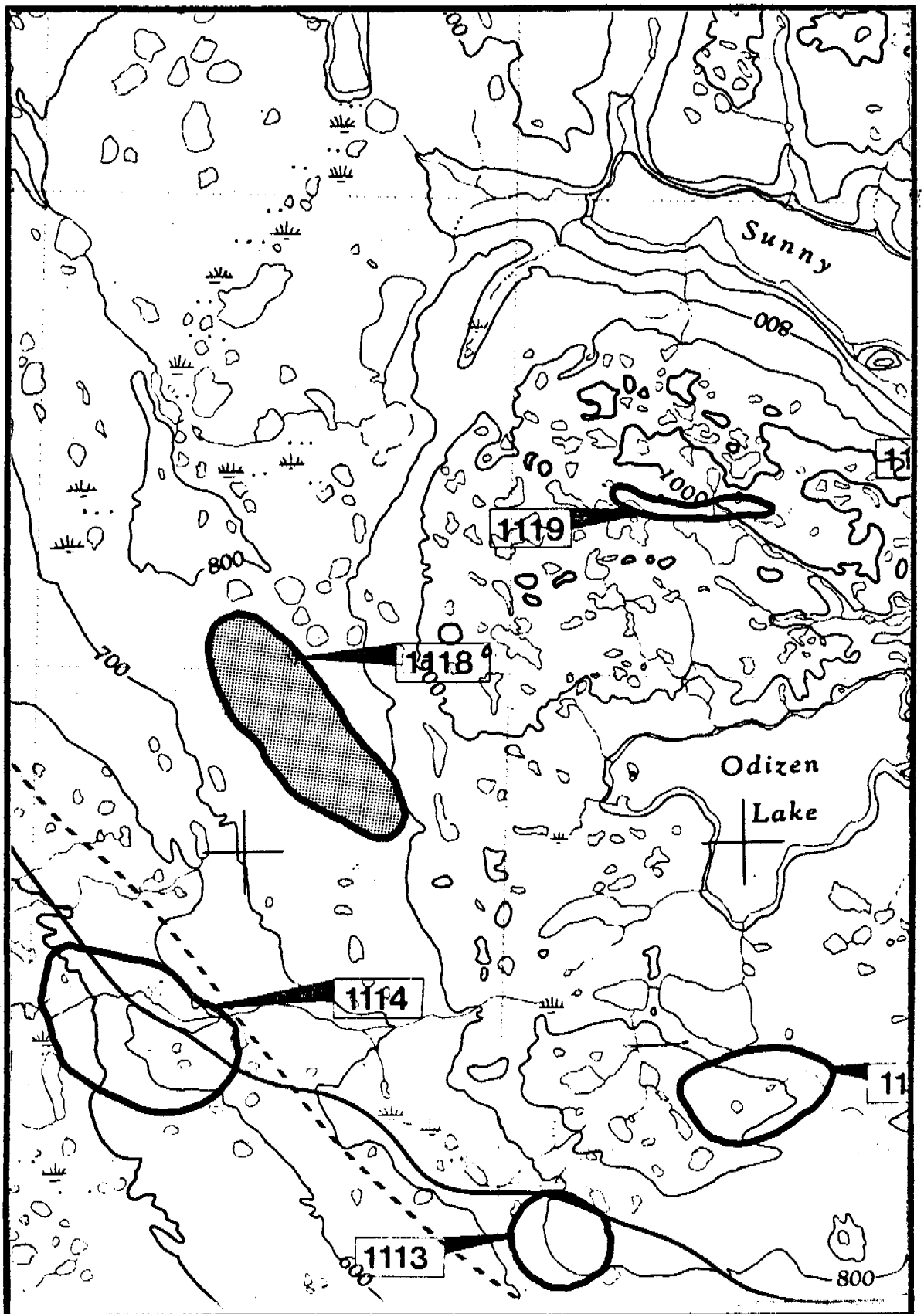
Assessment: The shale at site 1118 is overlain by overburden approximately 20 feet thick which is a frozen sandy silty clay unsuitable for engineering uses. The shale is suitable for use as fair quality general fill and is of almost unlimited volume. Moisture content of the shale is low. The



□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A21584-5 SCALE: 1" = 5500' (approx.)

site is on thermally sensitive ground; however, the site is within reasonable haulage distance from the proposed highway. A more comprehensive drilling program may reveal areas with less overburden. Site development by quarrying deep into the shale bedrock in order to utilize the dry, more friable material below 20 feet is recommended. The top 15 feet of overburden should be sloped back from the force of the pit and covered with organic debris stripped from the surface.



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: ARTIC RED RIVER 106-N

SCALE: 1:125,000

SITE 1118

ENVIRONMENTAL SENSITIVITY INDEX

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	TERRAIN (1) 2 3 4 5 Rating: 5	Formation Stability Ice Content	Flat Land, Terrace, Knoll, Rolling, Outcrop, Ridge, Scarp, Overburden Type & Depth, Wet Site, Dry Site.
5	VEGETATION 1 (2) 3 4 5 Rating: 10	Aesthetic Value Habitat Value	Marsh Black Spruce Muskeg White Spruce Mixed Conifer Conifer - Deciduous Deciduous Dry Slopes Riparian
15	MAMMALS 1 (2) 3 4 5 Rating: 30	Ungulates Furbearers Carnivores Small Mammals	Winter Range, Summer Range, Migration Route, Denning Area, Dams and Lodges, Special Habitat Use.
10	BIRDS 1 (2) 3 4 5 Rating: 20	Waterfowl-Swans, Geese, Ducks Game Birds Raptors Shorebirds Passerine	Migration Pathway, Moulting, Spring Staging, Fall Staging, Nesting-Brooding, Perching, Winter Habitat.
10	FISHERY (1) 2 3 4 5 Rating: 10	Lakes, Tributaries Mackenzie River: Whitefish, Smelt Grayling, Sculpin Pike, Goldeye Trout-Perch, Chub Lake Trout, Dace Burbot, Walleye Suckers, Char Stickleback, Cisco	Spawning, Nursery, Feeding, Overwintering. Major Migration Route. Siltation of Spawning Areas, Benthic Communities. Toxic Material Spill. Slumps, Velocity Increments, Migration Barriers. Eutrophication. Blasting.

R.I.R. - Relative Importance Units - Base of 100 units.

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	ARCHAEOLOGY (1) 2 3 4 5 Rating: 5	Paleontology Pre-Historic Historic	Probability of Discovery. Low, Medium, High. Known Sites.
10	AESTHETICS 1 (2) 3 4 5 Rating: 20	Visible from: Physical Disturbance	River, Highway, Air. Dust, Waste, Stockpiles, Noises.
15	RESOURCE UTILIZATION 1 (2) 3 4 5 Rating: 30	Fort Good Hope Arctic Red R. Inuvik	Improved Access, Traplines, Hunting, Fishing, Domestic, Commercial.
15	ASSOCIATED DISTURBANCES 1 (2) 3 4 5 Rating: 30	Access Roads Miles From Highway Miles From Pipeline Hydrologic Alterations Continued Use For Maintenance.	0-2, 2-5, 5-10, 10+ 0-2, 2-5, 5-10, 10+ Cuts and Fills, Creek Crossings, Compaction, Slumping, Erosion. Stockpiles, Waste, Dust.
10	RESTORATION 1 (2) 3 4 5 Rating: 20	Soil Stabilization Visual Improvement Habitat Replacement	Natural Regeneration, Grass-Legume Seeding, Transplants, Sustained Maintenance, Erosion Control Systems.

NOTE: SENSITIVITY INDEX RANGE

MINIMAL SENSITIVITY		MAXIMUM SENSITIVITY
100	TO	500

TOTAL INDEX: 180

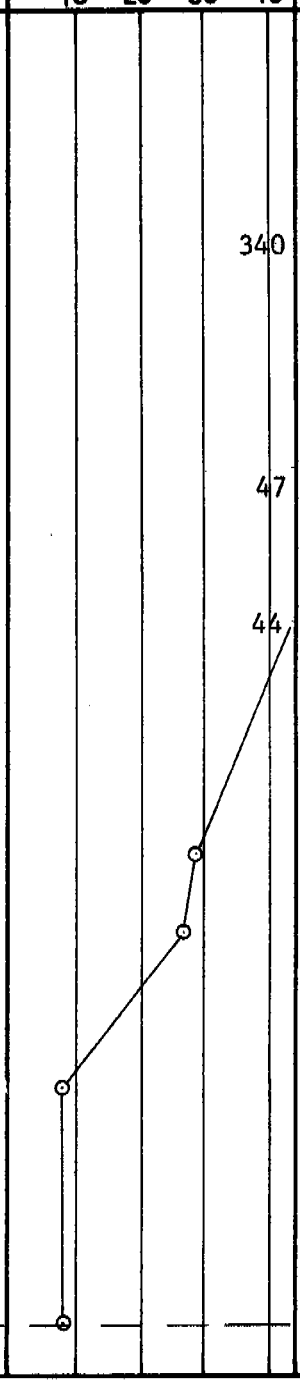
SPECIAL CONCERNS: Upland area. Shale formation with 20 feet of clay and organic overburden. Large amounts of overburden should be returned to pit.

F.F. SLANEY & COMPANY LIMITED
VANCOUVER, B. C.

GRANULAR MATERIALS INVENTORY - STAGE III

SITE NO. 1118 HOLE NO. 1 PAGE 1 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION
1–3	PT-OH	TOPSOIL peat and organic	
3–8	CH-CI	CLAY organic silty -ice lenses	
8–14	CI	CLAY sandy silty -till -medium plastic -ice lenses	
14–17		SHALE -soft becoming medium hard to 23'	



DATE DRILLED: June /73 LOGGED BY: DPW 37 COMPLETION DEPTH: 30'

DRILLING METHOD: HELI THAW DEPTH: N/A

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY - STAGE III

SITE NO. 1118 HOLE NO. 1 PAGE 2 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
18		SHALE soft becoming medium hard to 23'			18
19					19
20					20
21					21
22					22
23					23
24					24
25					25
26					26
27					27
28					28
29					29
30					30
31					31
32					32
33					33
34					34

DATE DRILLED: June /73 LOGGED BY: DPW 37 COMPLETION DEPTH: 30'

DRILLING METHOD: HELI THAW DEPTH: N/A

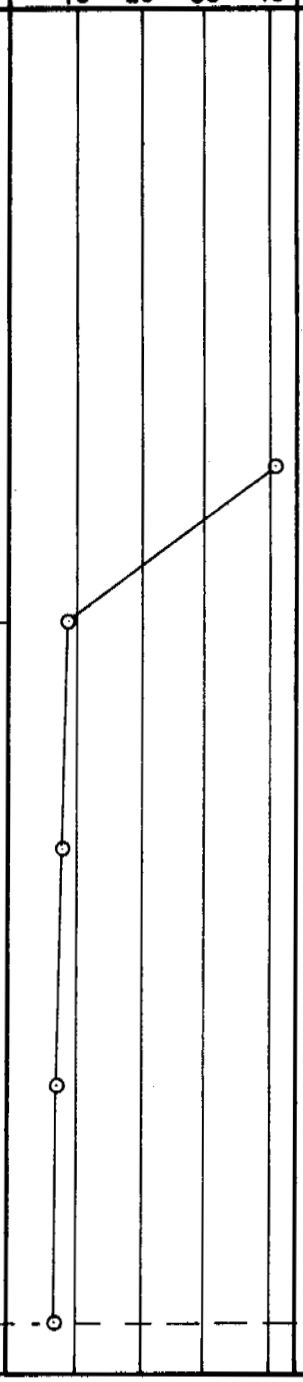
GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1118 HOLE NO. 2 PAGE 1 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION
1, 2, 3	PT	MUSKEG, PEAT, AND ORGANIC MATERIAL	FROZEN
4, 5, 6, 7, 8	CL	CLAY -sandy silty -low to medium plastic -very wet on thawing	Vs
9, 10, 11, 12, 13, 14, 15, 16, 17	CL	SHALE -soft -frozen -occassional thin ice lenses -dry to damp on thawing	Nf



DATE DRILLED: June 19/73 LOGGED BY: DPW 1 COMPLETION DEPTH: 25'

DRILLING METHOD: HELI THAW DEPTH: N/A

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY - STAGE III

SITE NO. 1118 HOLE NO. 2 PAGE 2 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
18			Nf		18
19					19
20	CL	SHALE -soft			20
21		-frozen -occassional thin ice lenses			21
22		-dry to damp on thawing			22
23					23
24					24
25					25
26					26
27					27
28					28
29					29
30					30
31					31
32					32
33					33
34					34

DATE DRILLED: June 19/73 LOGGED BY: DPW 1 COMPLETION DEPTH: 25'

DRILLING METHOD: HELI THAW DEPTH: N/A

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

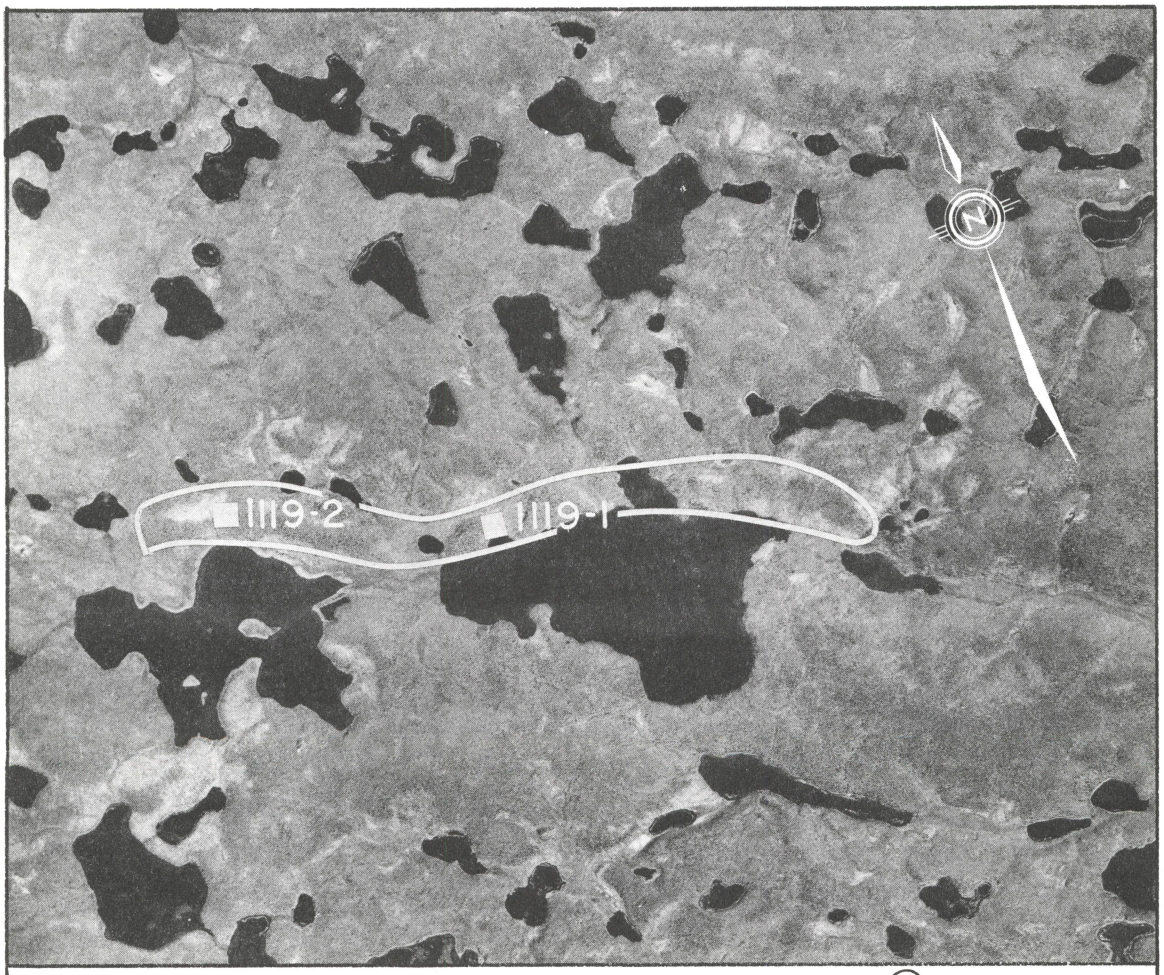
EBA Engineering Consultants Ltd.

SITE 1119a

Location: Site 1119 is 3 1/2 miles south of Sunny Lake. The proposed pipeline and highway routes are 8 and 9 1/2 miles south-west of the site respectively.

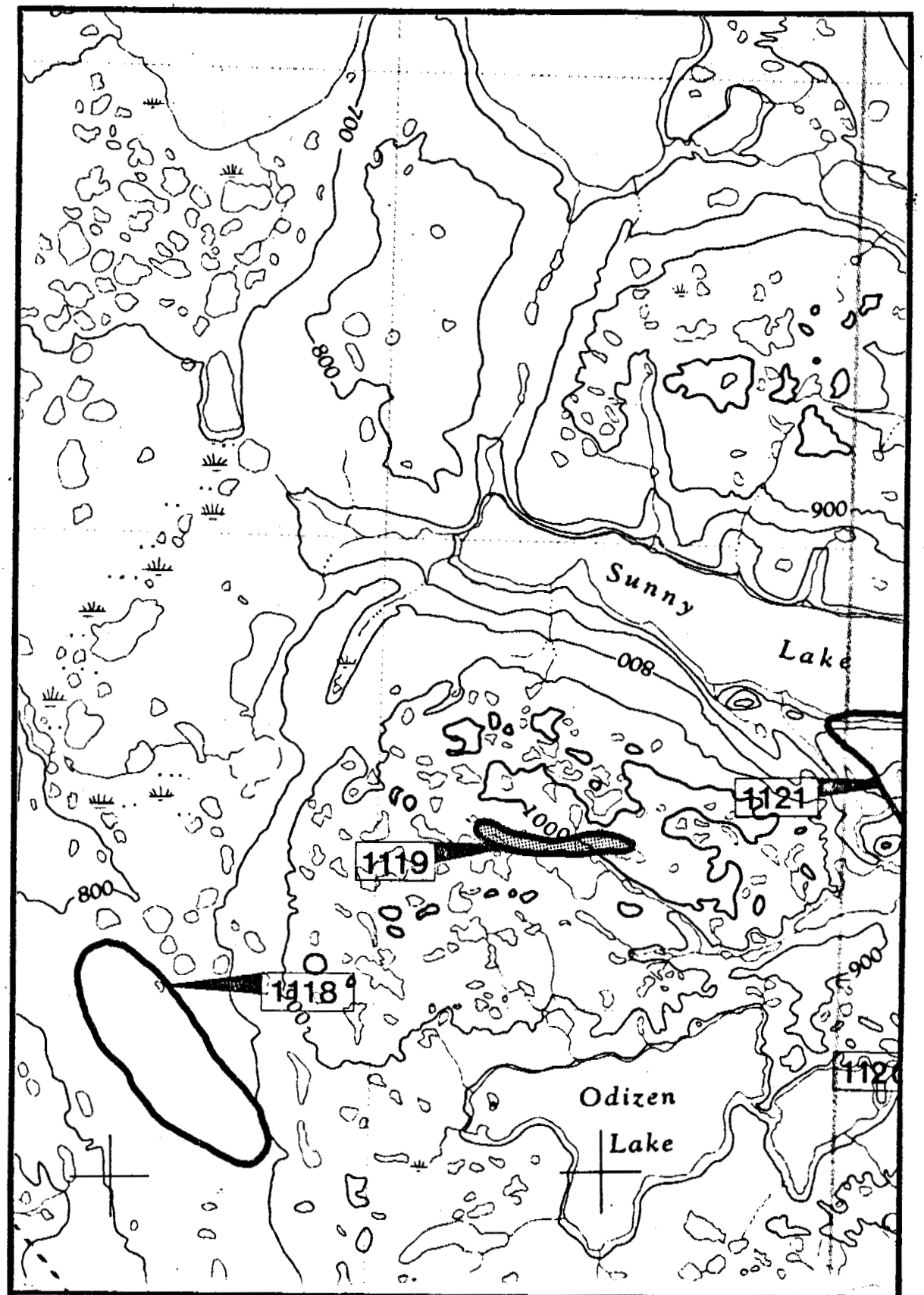
Material: Peat and clay.

Assessment: The site is not recommended for development



□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A22964-154 SCALE: 1" = 3000' (approx.)



SITE LIMITS

PROPOSED GAS PIPELINE

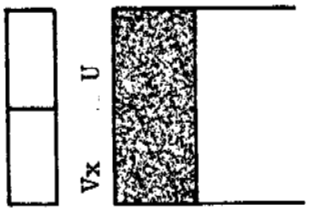
PROPOSED MACKENZIE HIGHWAY

MAPS: ARTIC RED RIVER 106-N

SCALE: 1:125,000

TEST PIT LOG

TP 1119-1



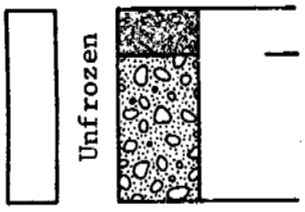
0.0

Peat, brown

Frozen peat, high ice content

2.0

TP 1119-2



0.0

Moss

0.5

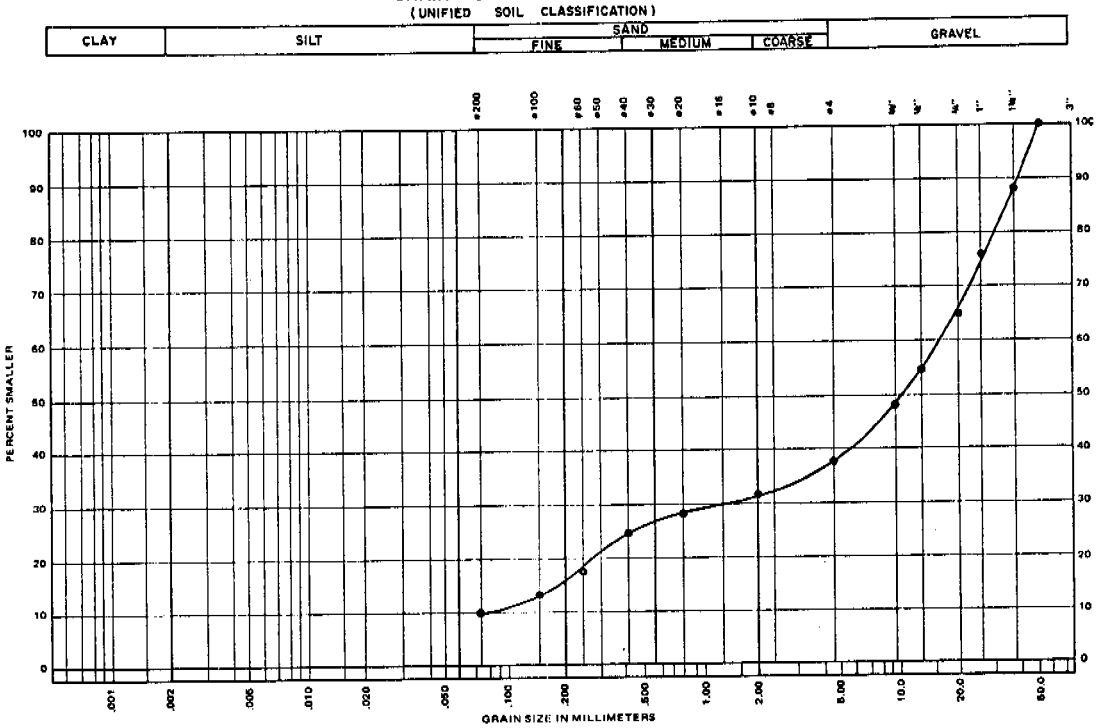
Gravel, light brown
well graded
dense & dry

62% GRAVEL
28% SAND
10% SILT & CLAY

2.0

GRAIN SIZE DISTRIBUTION

(UNIFIED SOIL CLASSIFICATION)



EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Gravel and Some Sand With a Trace of Silt (GP-GM) M/C=5.2%

PROJECT Granular Resources
JOB No. E-666 DATE
SAMPLE No. TP 1119-2
DEPTH 2'

SITE 1120

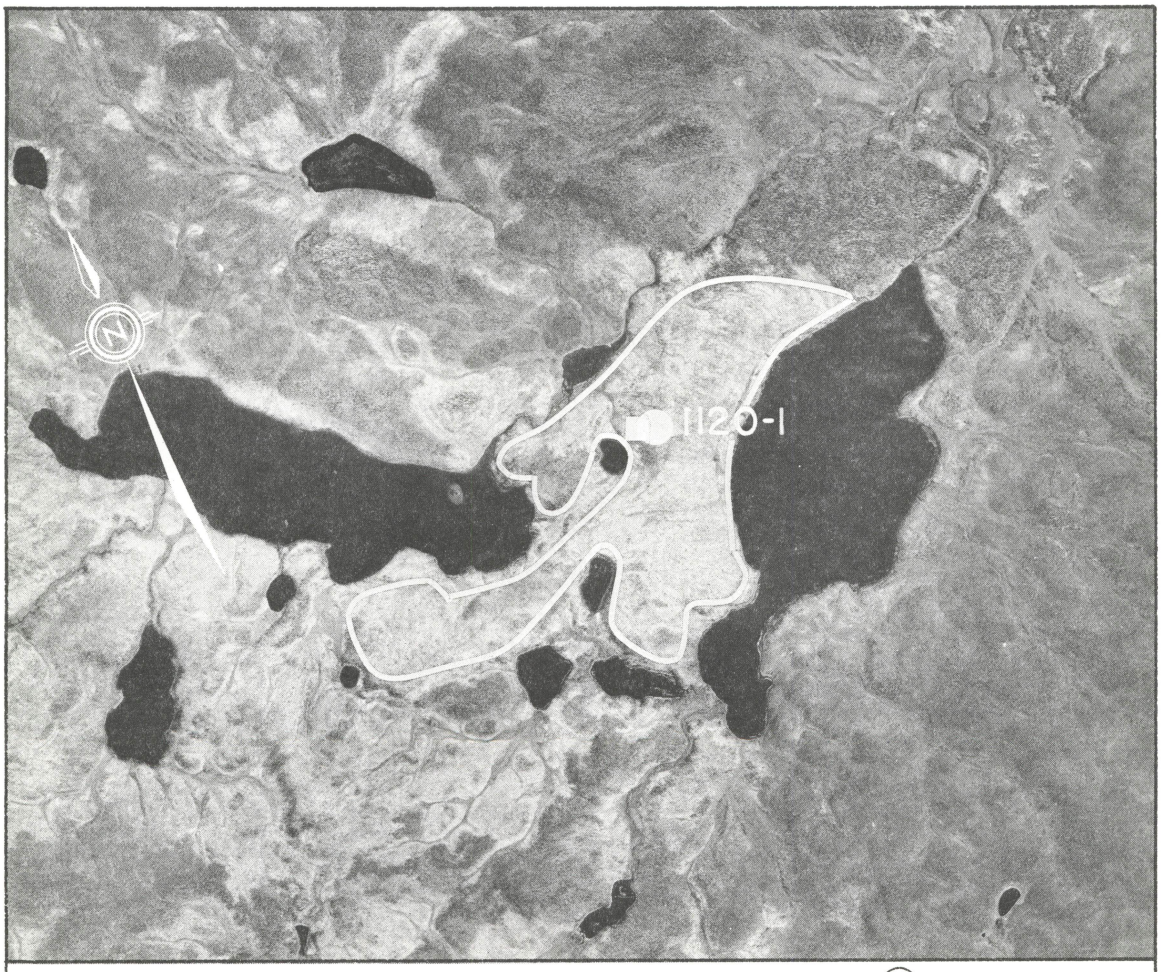
Location: Site 1120 is located along the north-west shore of Lower Overflow Lake. Proposed pipeline and highway routes are 13 and 8 1/2 miles south-west of the site respectively.

Geology: The material at site 1120 is contained in an outwash deposit. Little variation is anticipated in the material.

Material: Sand and gravel, some silt, well graded.

Volume: 1,500,000 cu. yd.

Area: 100 acres.

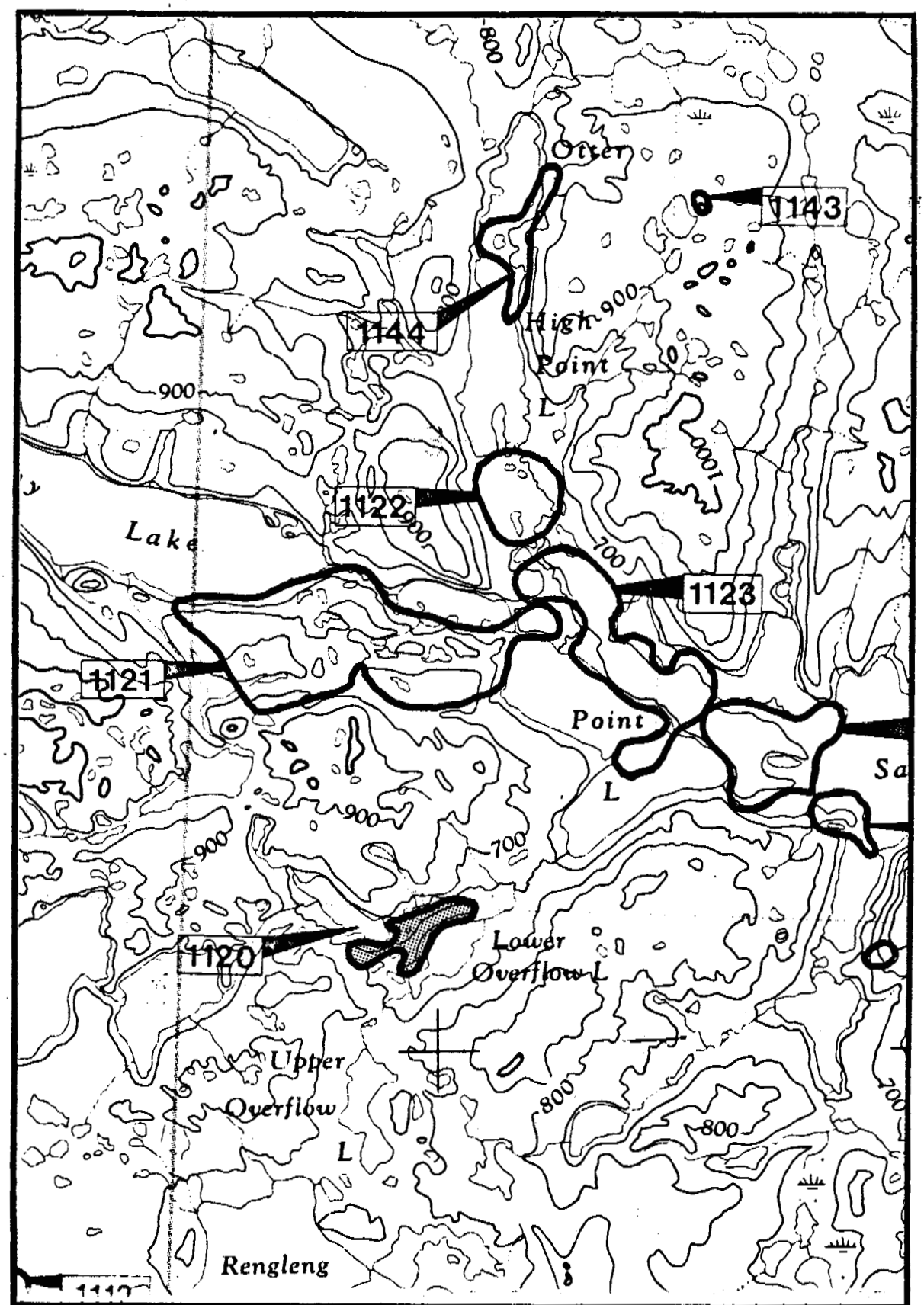


□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A22964-151 SCALE: 1" = 3000' (approx.)

Drainage: The site is well drained.

Assessment: The borrow material found at site 1120 is of good quality and a reasonably large volume is anticipated. Selective excavation may yield material suitable for processing into concrete aggregate. Processing would entail screening the fraction above the 1/4 inch sieve, washing it and then crushing part of it to obtain a sand fraction. Approximately 2 feet of peat-silt-clay overburden, which can be removed and stockpiled for use in restoration, overlies the gravel. Vegetative cover of brush and sparse spruce can be removed with the overburden. Permafrost was encountered at a depth of 7 feet. Access to the site crosses thermally sensitive and hilly terrain thus, winter operations will be necessary. Haulage distance to proposed construction sites is long. The site has a high environmental sensitivity rating. In view of the long haulage distance it does not appear, at the present, to be feasible to develop site 1120. If, however, there are shortages of material the site can be considered for development. General borrow pit development and environmental guidelines are contained in this report.



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: ARTIC RED RIVER 106-N

SCALE: 1:125,000

SITE 1120

ENVIRONMENTAL SENSITIVITY INDEX

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	TERRAIN 1 2 (3) 4 5 Rating: 15	Formation Stability Ice Content	Flat Land, Terrace, Knoll, Rolling, Outcrop, Ridge, Scarp, Overburden Type & Depth, Wet Site, Dry Site.
5	VEGETATION 1 (2) 3 4 5 Rating: 20	Aesthetic Value Habitat Value	Marsh Black Spruce Muskeg White Spruce Mixed Conifer Conifer - Deciduous Deciduous Dry Slopes Riparian
15	MAMMALS 1 2 3 (4) 5 Rating: 60	Ungulates Furbearers Carnivores Small Mammals	Winter Range, Summer Range, Migration Route, Denning Area, Dams and Lodges, Special Habitat Use.
10	BIRDS 1 (2) 3 4 5 Rating: 20	Waterfowl-Swans, Geese, Ducks Game Birds Raptors Shorebirds Passerine	Migration Pathway, Moulting, Spring Staging, Fall Staging, Nesting-Brooding, Perching, Winter Habitat.
10	FISHERY 1 2 3 (4) 5 Rating: 40	Lakes, Tributaries Mackenzie River: Whitefish, Grayling, Pike, Trout-Perch, Lake Trout, Burbot, Suckers, Stickleback Smelt, Sculpin, Goldeye, Chub, Dace, Walleye, Char, Cisco	Spawning, Nursery, Feeding, Overwintering. Major Migration Route. Siltation of Spawning Areas, Benthic Communities. Toxic Material Spill. Slumps, Velocity Increments, Migration Barriers. Eutrophication. Blasting.

R.I.R. - Relative Importance Units - Base of 100 units.

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	ARCHAEOLOGY 1 2 (3) 4 5 Rating: 15	Paleontology Pre-Historic Historic	Probability of Discovery. Low, Medium, High. Known Sites.
10	AESTHETICS 1 2 3 4 5 Rating: 10	Visible from: Physical Disturbance	River, Highway, Air. Dust, Waste, Stockpiles. Noises.
15	RESOURCE UTILIZATION 1 2 3 4 (5) Rating: 75	Fort Good Hope Arctic Red R. Inuvik	Improved Access. Traplines. Hunting. Fishing. Domestic. Commercial.
15	ASSOCIATED DISTURBANCES 1 2 3 4 (5) Rating: 75	Access Roads Miles From Highway Miles From Pipeline Hydrologic Alterations Continued Use For Maintenance.	0-2, 2-5, 5-10, 10+ 0-2, 2-5, 5-10, 10+ Cuts and Fills. Creek Crossings. Compaction. Slumping, Erosion. Stockpiles, Waste, Dust.
10	RESTORATION (1) 2 3 4 5 Rating: 10	Soil Stabilization Visual Improvement Habitat Replacement	Natural Regeneration. Grass-Legume Seeding. Transplants. Sustained Maintenance. Erosion Control Systems.

NOTE: SENSITIVITY INDEX RANGE

MINIMAL SENSITIVITY		MAXIMUM SENSITIVITY
100	TO	500

TOTAL INDEX: 340

SPECIAL CONCERNS: Within Barren Ground Caribou winter range. Near lake and creek system. Siltation controls recommended. Denning habitat should be maintained.

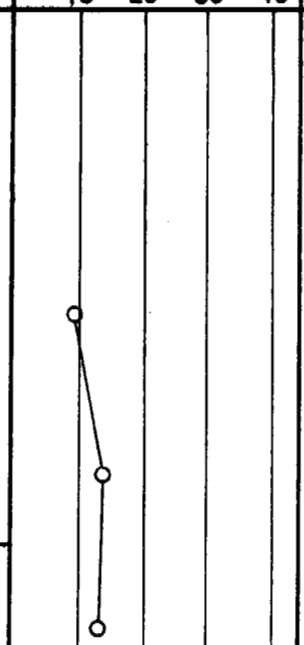
F.F. SLANEY & COMPANY LIMITED
VANCOUVER, B. C.

GRANULAR MATERIALS INVENTORY - STAGE III

SITE NO. 1120 HOLE NO. 1 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION
	Pt	PEAT: -fibrous, medium brown	NOT FROZEN
1	ML	SILT, clayey -some coarse sand and fine gravel, medium brown	
2			
3	GM	GRAVEL -some sand, light brown	
4			
5		-very sandy, fine to medium gravel, maximum 1 1/2", grey brown	
6	GM	(4'-8') 39% GRAVEL 43% SAND 18% SILT & CLAY	
7			Nbn
8			
9			
10		END OF HOLE	
11			
12			
13			
14			
15			
16			
17			

MOISTURE CONTENT %



DEPTH (feet): 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

DATE DRILLED: Sep. 15/73

LOGGED BY: EBA 109-1

COMPLETION DEPTH: 9.5'

DRILLING METHOD: AUGER

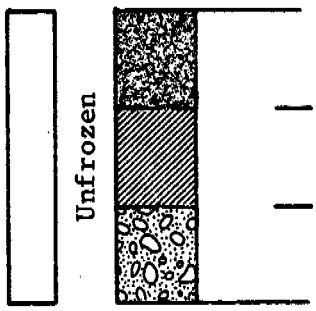
THAW DEPTH: 7.0'

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

TEST PIT LOG

TP 1120-1

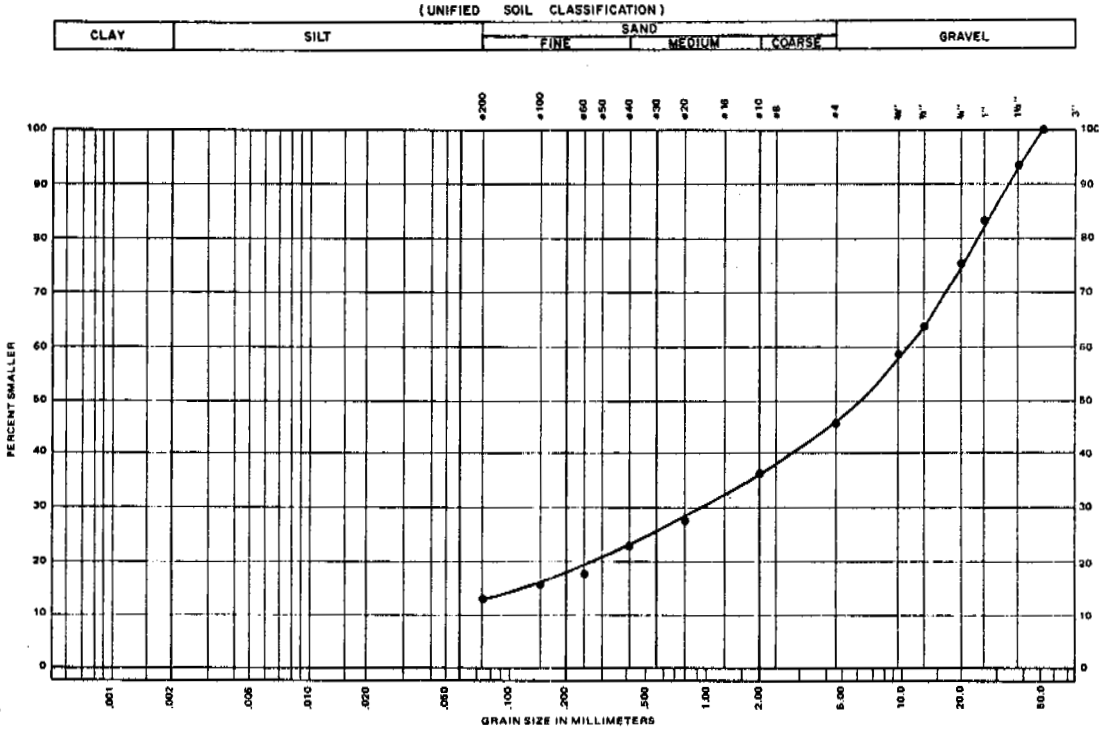


0.0	Peat	
1.0	Clay	
2.0	Gravel, sandy light brown very wet	55% GRAVEL 31% SAND 14% SILT & CLAY
3.5		

PETROGRAPHIC ANALYSIS

Limestone	8%
Dolomite	2%
Sandstone (fissile)	14%
Sandstone (competant)	34%
Shale - Siltstone	7%
Chert	1%
Quartzite	4%
Ironstone	6%
Gneiss - schist	1%
Granite	4%
Basalt	18%
Others	1%

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

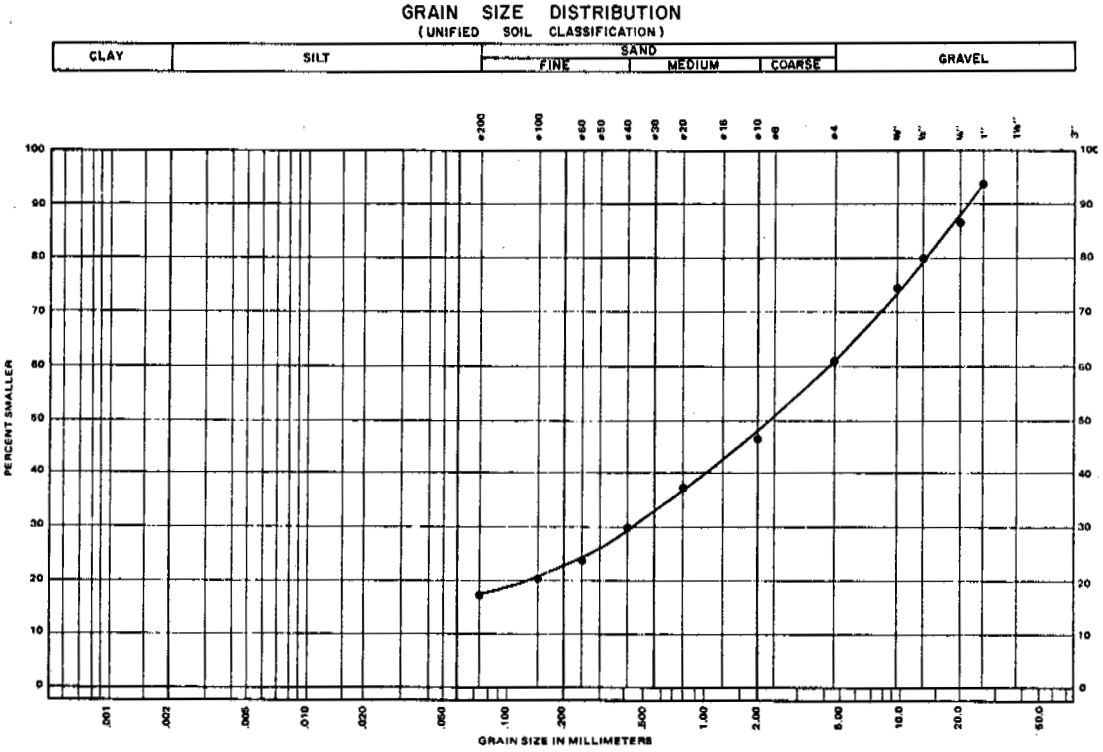


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Sand and Gravel and Some Silt (GW-GM) M/C = 11.3%

PROJECT Granular Resources
JOB No. E-666 DATE Oct. 15/73
SAMPLE No. TP 1120-1
DEPTH 3.5'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Sand and Gravel and Some Silt (GM)

PROJECT Granular Resources
JOB No. E-666 DATE Nov. 5/73
SAMPLE No. BH 1120-1
DEPTH 4' - 8'

SITE 1121

Location: Site 1121 is located between Point Lake and Sunny Lake. The site is 14 miles north-east of the proposed highway and pipeline routes.

Geology: Site 1121 is part of an extremely large outwash deposit. Some variation in the material may be expected over the area.

Material: Sand and gravel, some silt, well graded.

Volume: 26,500,000 cu. yd., estimate seems realistic.

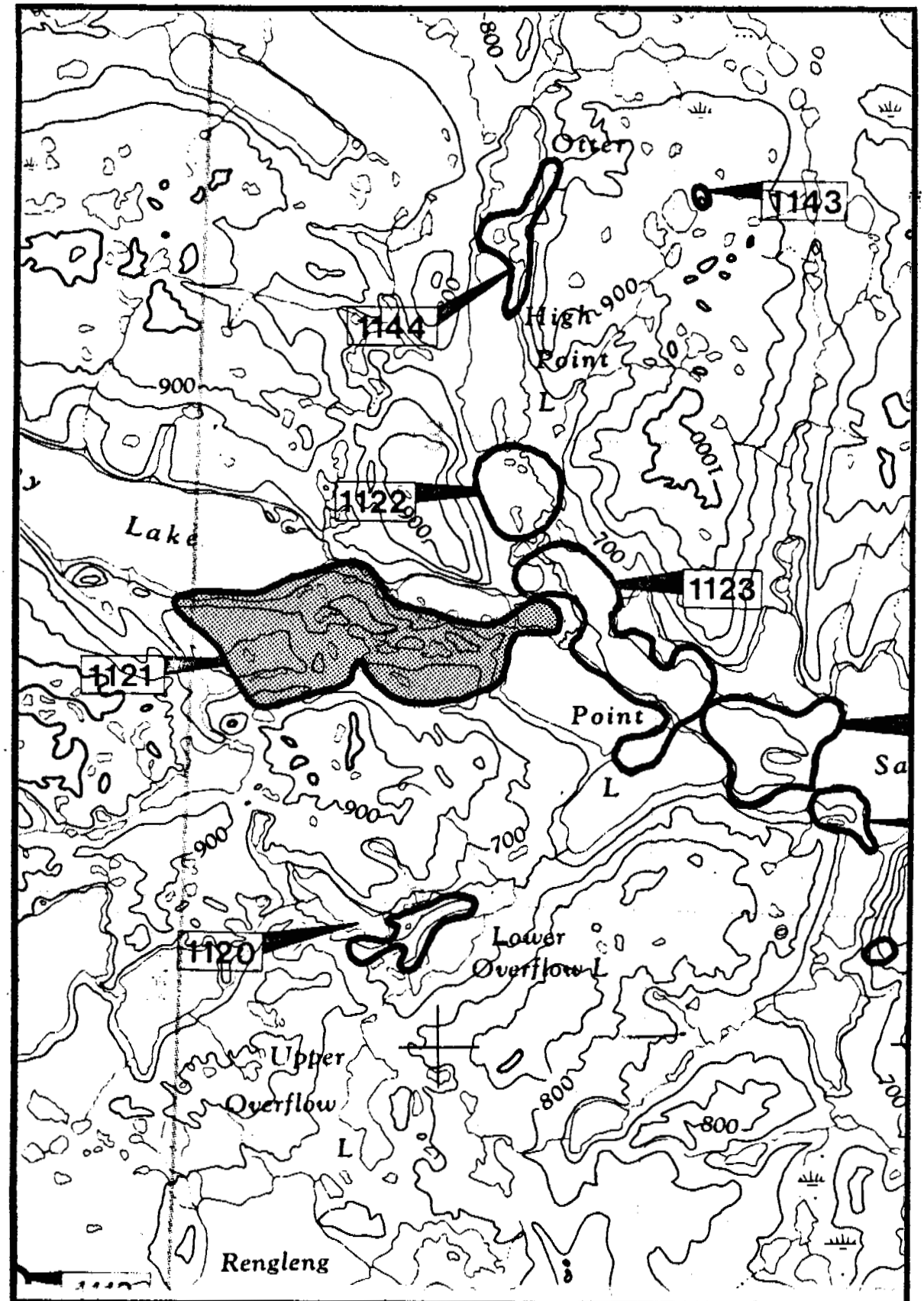
Area: 1000 acres.

Drainage: The site is well drained.

Assessment: An extremely large volume of good quality borrow is present at site 1121. A more comprehensive drilling program will be necessary to deliniate areas of materials of different qualities. It is probable that material suitable for processing into concrete aggregate is available from the site. Unless material with silt content less than 5% is available processing will include screening off the fraction above the 1/4 inch sieve, washing it and then crushing part of it to obtain a sand fraction. Overburden is negligible but dense willow and birch will have to be removed. Borings to a depth of 16 feet did not encounter permafrost. The site has been assessed a high environmental sensitivity rating. Access to the site is not difficult but crosses thermally sensitive terrain which will necessitate winter operations. Haulage distance to proposed construction sites is very long. If material shortages are critical in the area site 1121 can be considered for development. General borrow pit development and environmental guidelines are contained in this report.

□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A23016-96 SCALE: 1" = 3000' (approx.)



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: ARTIC RED RIVER 106-N

SCALE: 1:125,000

SITE 1121

ENVIRONMENTAL SENSITIVITY INDEX

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	TERRAIN 1 (2) 3 4 5 Rating: 10	Formation Stability Ice Content	Flat Land, Terrace, Knoll, Rolling, Outcrop, Ridge, Scarp, Overburden Type & Depth, Wet Site, Dry Site.
5	VEGETATION 1 2 (3) 4 5 Rating: 15	Aesthetic Value Habitat Value	Marsh Black Spruce Muskeg White Spruce Mixed Conifer Conifer - Deciduous Deciduous Dry Slopes Riparian
15	MAMMALS 1 2 (3) 4 5 Rating: 45	Ungulates Furbearers Carnivores Small Mammals	Winter Range, Summer Range, Migration Route, Denning Area, Dams and Lodges, Special Habitat Use.
10	BIRDS 1 2 (3) 4 5 Rating: 30	Waterfowl-Swans, Geese, Ducks Game Birds Raptors Shorebirds Passerine	Migration Pathway, Moulting, Spring Staging, Fall Staging, Nesting-Brooding, Perching, Winter Habitat.
10	FISHERY 1 2 3 (4) 5 Rating: 40	Lakes, Tributaries Mackenzie River: Whitefish, Smelt Grayling, Sculpin Pike, Goldeye Trout-Perch, Chub Lake Trout, Dace Burbot, Walleye Suckers, Char Stickleback, Cisco	Spawning, Nursery, Feeding, Overwintering. Major Migration Route. Siltation of Spawning Areas, Benthic Communities. Toxic Material Spill. Slumps, Velocity Increments. Migration Barriers. Eutrophication. Blasting.

R.I.R. - Relative Importance Units - Base of 100 units.

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	ARCHAEOLOGY 1 2 (3) 4 5 Rating: 15	Paleontology Pre-Historic Historic	Probability of Discovery. Low, Medium, High. Known Sites.
10	AESTHETICS 1 2 3 4 5 Rating: 20	Visible from: Physical Disturbance	River, Highway, Air. Dust, Waste, Stockpiles. Noises.
15	RESOURCE UTILIZATION 1 2 3 (4) 5 Rating: 60	Fort Good Hope Arctic Red R. Inuvik	Improved Access. Traplines. Hunting. Fishing. Domestic. Commercial.
15	ASSOCIATED DISTURBANCES 1 2 3 4 (5) Rating: 75	Access Roads Miles From Highway Miles From Pipeline Hydrologic Alterations Continued Use For Maintenance.	0-2, 2-5, 5-10, 10+ 0-2, 2-5, 5-10, 10+ Cuts and Fills. Creek Crossings. Compaction. Slumping, Erosion. Stockpiles. Waste, Dust.
10	RESTORATION 1 2 (3) 4 5 Rating: 30	Soil Stabilization Visual Improvement Habitat Replacement	Natural Regeneration. Grass-Legume Seeding. Transplants. Sustained Maintenance. Erosion Control Systems.

NOTE: SENSITIVITY INDEX RANGE

MINIMAL SENSITIVITY		MAXIMUM SENSITIVITY
100	TO	500

TOTAL INDEX: 340

SPECIAL CONCERNS: Straddles creek and lake east of Sunny Lake. Within Barren-Ground Caribou winter range. Denning and aquatic habitats important.

F.F. SLANEY & COMPANY LIMITED
VANCOUVER, B. C.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1121 HOLE NO. 1 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
		COBBLES: Large, subrounded	NOT FROZEN		
1	OL	ORGANIC SILT: -some cobbles, black			1
2	GM	SAND AND GRAVEL: -very silty, trace of clay, quite loose, gravel subrounded to angular, fine to medium grained, medium to dark brown.			2
3					3
4					4
5					5
6		-very wet, very soft, gravel fine.			6
7					7
8					8
9					9
10					10
11					11
12					12
13		END OF HOLE			13
14		*VERY WET, SAME ELEVATION AS WATER IN ADJACENT LAKE			14
15					15
16					16
17					17

DATE DRILLED: Sep.15/73 LOGGED BY: EBA 110-1 COMPLETION DEPTH: 12.0'

DRILLING METHOD: AUGER THAW DEPTH: N/A

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY - STAGE III

SITE NO. 1121 HOLE NO. 2 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
1	Pt	PEAT: -some silt, fibrous, brown	NOT FROZEN TO SOFT FROZEN		1
2 3 4 5 6	SM	SILT AND SAND: -some fine gravel, sand fine to medium fine, grey-brown -more gravelly -less gravelly			2 3 4 5 6
7 8 9 10 11 12 13 14 15 16	SC-ML	SILT AND SAND: -trace-clay, sand well graded from fine to medium coarse, no to low plasticity, brown-grey			7 8 9 10 11 12 13 14 15 16
17		END OF HOLE			17

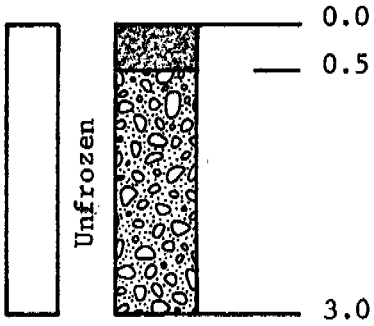
DATE DRILLED: Sep. 15/73	LOGGED BY: EBA 110-2	COMPLETION DEPTH: 16.0'
DRILLING METHOD: AUGER		THAW DEPTH: N/A

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

TEST PIT LOG

TP 1121-1

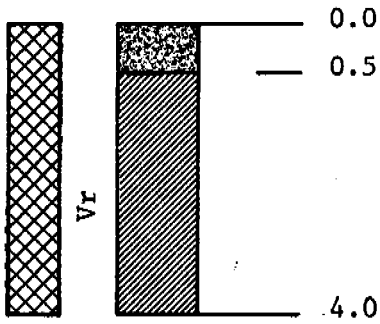


Moss

Gravel

47% GRAVEL
31% SAND
22% SILT & CLAY

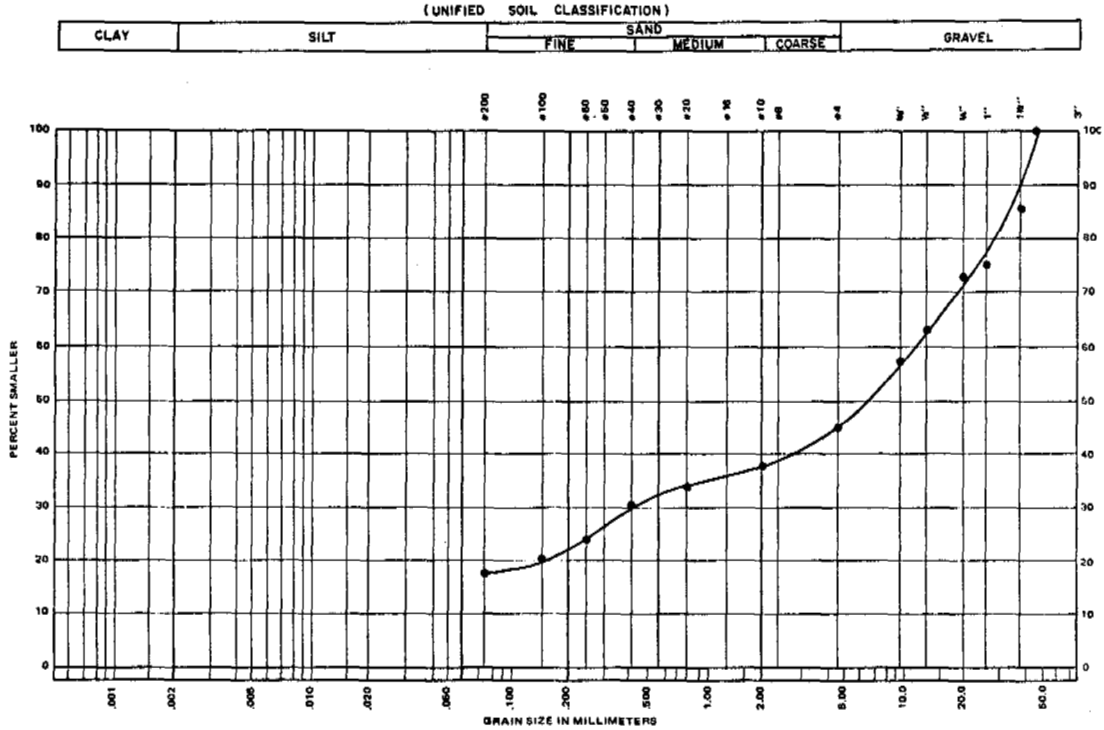
TP 1121-2



Peat

Silty Clay, frozen

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

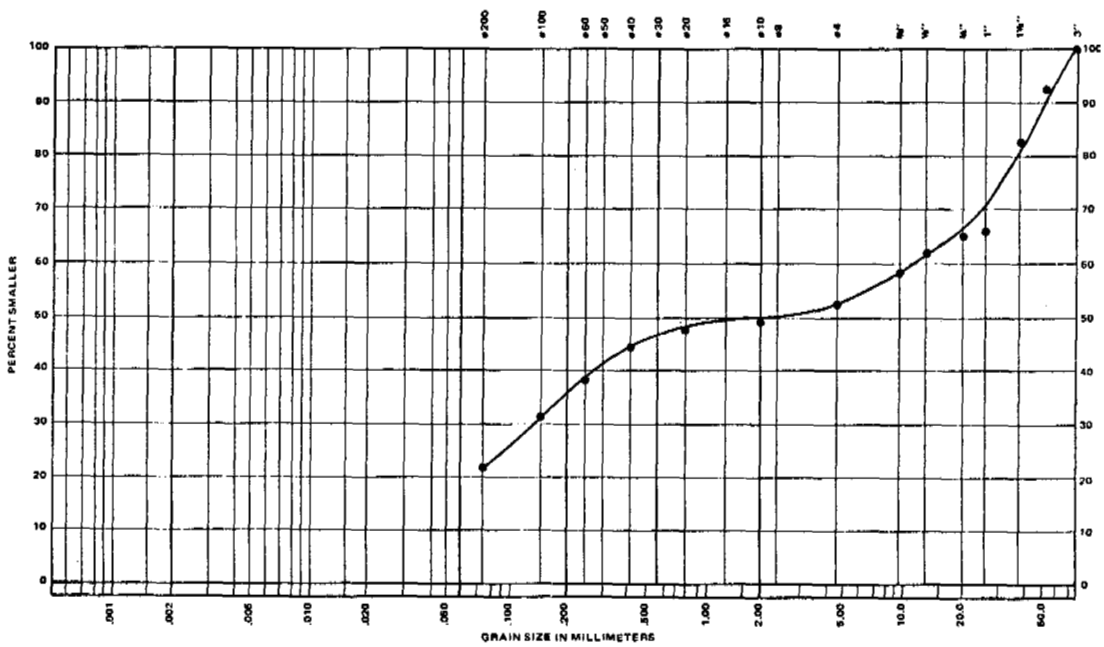


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Sandy Gravel and Some Silt (GM) M/C = 5%

PROJECT Granular Resources
JOB No. E-666 DATE
SAMPLE No. TP 1121-1
DEPTH 0.5'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Silty Sand and Gravel (GM) M/C = 5.8% - 11.6%

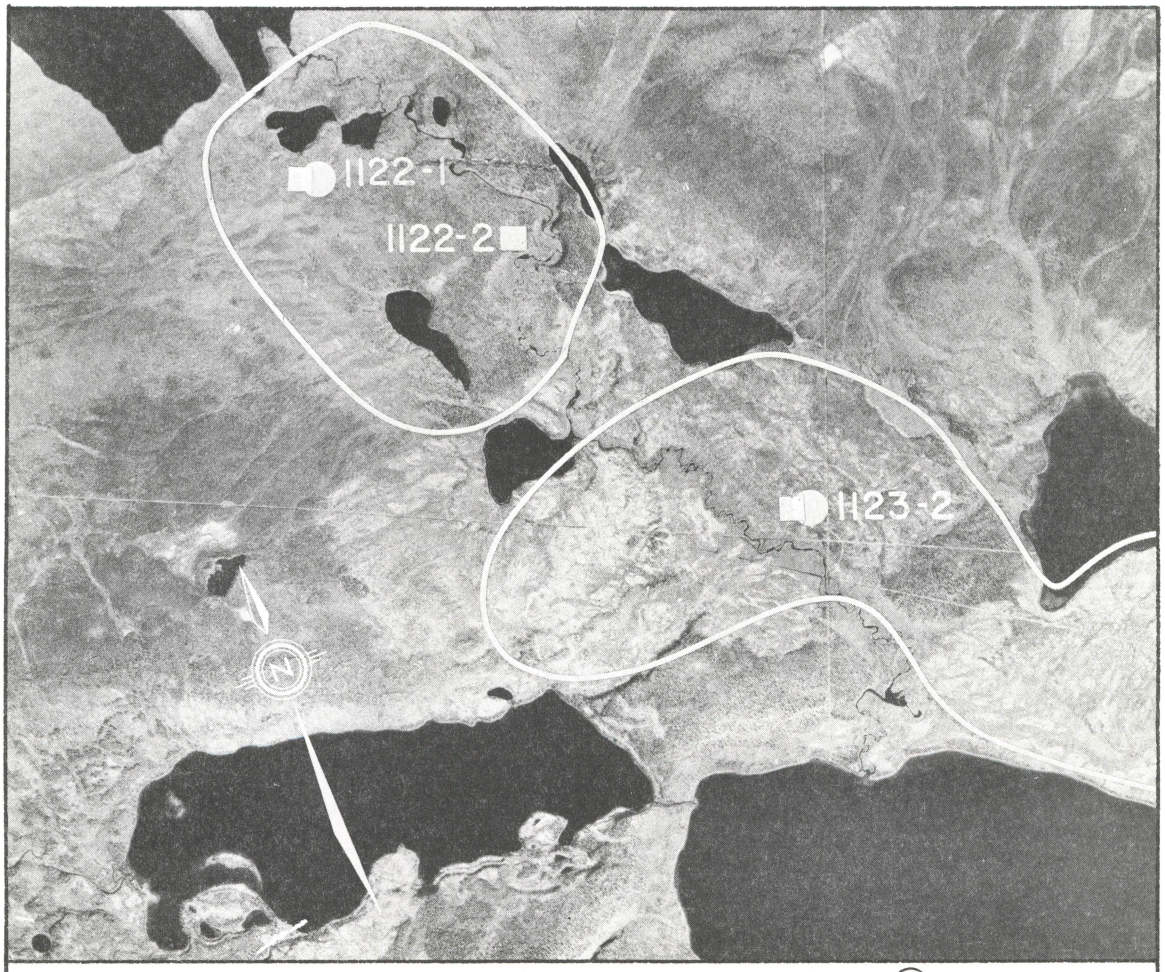
PROJECT Granular Resources
JOB No. E-666 DATE
SAMPLE No. TP 1121-1
DEPTH 3'

SITE 1122a

Location: Site 1122 is located between High Point Lake and Point Lake. The site is approximately 16 miles north-east of the proposed highway and railway routes.

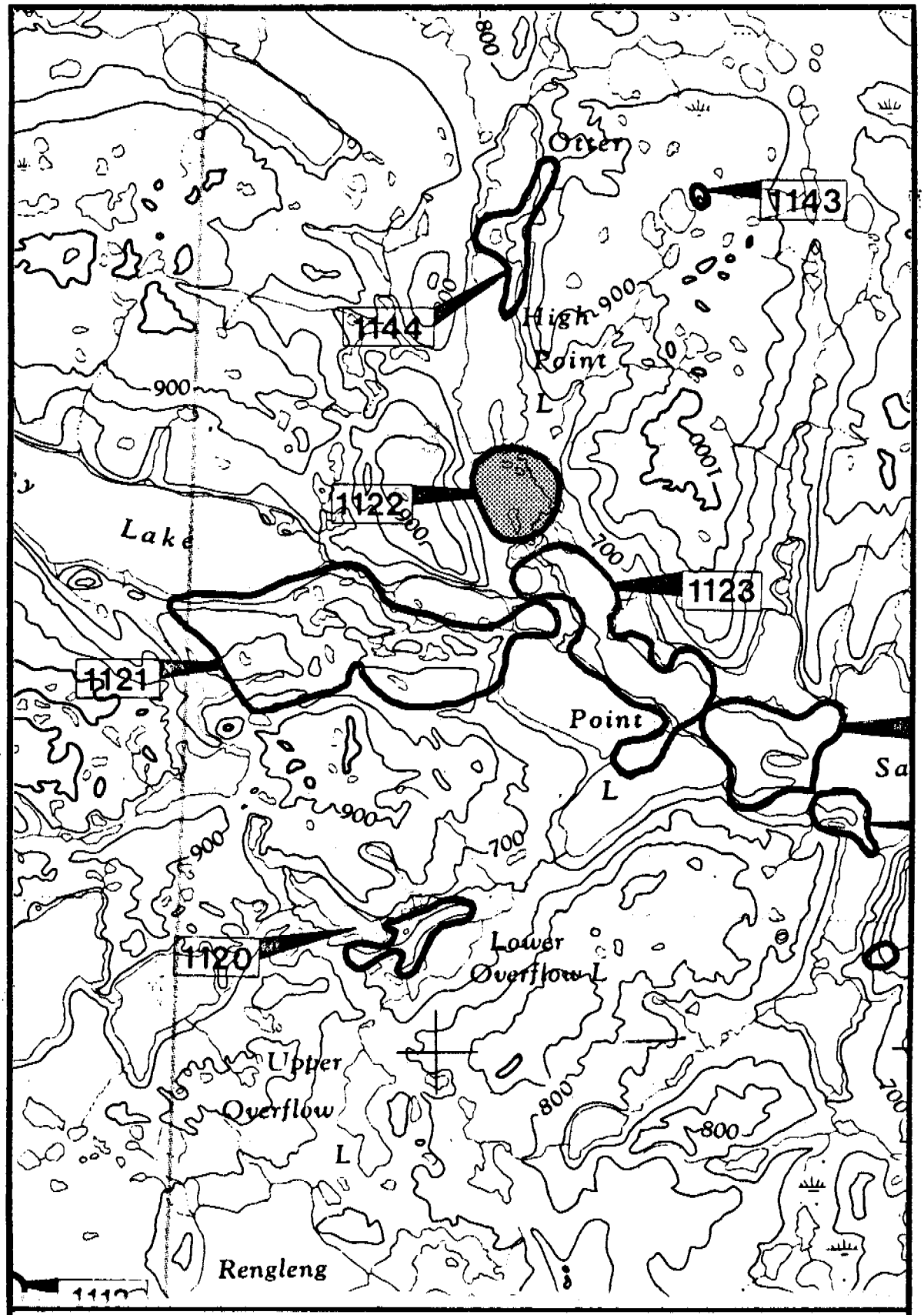
Material: Silt, clayey, sandy.

Assessment: The material at site 1122 is unsuitable for engineering uses. The site is not recommended for development.



□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A23016-95 SCALE: 1" = 3000' (approx.)



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: ARTIC RED RIVER 106-N

SCALE: 1:125,000

SITE 1122

ENVIRONMENTAL SENSITIVITY INDEX

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	TERRAIN 1 (2) 3 4 5 Rating: 10	Formation Stability Ice Content	Flat Land, Terrace, Knoll, Rolling, Outcrop, Ridge, Scarp, Overburden Type & Depth, Wet Site, Dry Site.
5	VEGETATION 1 (2) 3 4 5 Rating: 10	Aesthetic Value Habitat Value	Marsh Black Spruce Muskeg White Spruce Mixed Conifer Conifer - Deciduous Deciduous Dry Slopes Riparian
15	MAMMALS 1 2 (3) 4 5 Rating: 45	Ungulates Furbearers Carnivores Small Mammals	Winter Range, Summer Range, Migration Route, Denning Area, Dams and Lodges, Special Habitat Use.
10	BIRDS 1 (2) 3 4 5 Rating: 20	Waterfowl-Swans, Geese, Ducks Game Birds Raptors Shorebirds Passerine	Migration Pathway, Moulting, Spring Staging, Fall Staging, Nesting-Brooding, Perching, Winter Habitat.
10	FISHERY 1 2 3 (4) 5 Rating: 40	Lakes, Tributaries Mackenzie River: Whitefish, Smelt Grayling, Sculpin Pike, Goldeye Trout-Perch, Chub Lake Trout, Dace Burbot, Walleye Suckers, Char Stickleback, Cisco	Spawning, Nursery, Feeding, Overwintering. Major Migration Route. Siltation of Spawning Areas, Benthic Communities. Toxic Material Spill. Slumps, Velocity Increments, Migration Barriers. Eutrophication. Blasting.

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	ARCHAEOLOGY 1 2 (3) 4 5 Rating: 15	Paleontology Pre-Historic Historic	Probability of Discovery. Low, Medium, High. Known Sites.
10	AESTHETICS (1) 2 3 4 5 Rating: 10	Visible from: Physical Disturbance	River, Highway, Air. Dust, Waste, Stockpiles. Noises.
15	RESOURCE UTILIZATION 1 2 3 (4) 5 Rating: 60	Fort Good Hope Arctic Red R. Inuvik	Improved Access. Traplines. Hunting. Fishing. Domestic. Commercial.
15	ASSOCIATED DISTURBANCES 1 2 3 4 (5) Rating: 75	Access Roads Miles From Highway Miles From Pipeline Hydrologic Alterations Continued Use For Maintenance.	0-2, 2-5, 5-10, 10+ 0-2, 2-5, 5-10, 10+ Cuts and Fills. Creek Crossings. Compaction, Slumping, Erosion. Stockpiles, Waste, Dust.
10	RESTORATION 1 (2) 3 4 5 Rating: 20	Soil Stabilization Visual Improvement Habitat Replacement	Natural Regeneration. Grass-Legume Seeding. Transplants. Sustained Maintenance. Erosion Control Systems.

R.I.R. - Relative Importance Units - Base of 100 units.

NOTE: SENSITIVITY INDEX RANGE

MINIMAL SENSITIVITY		MAXIMUM SENSITIVITY
100	TO	500

TOTAL INDEX: 305

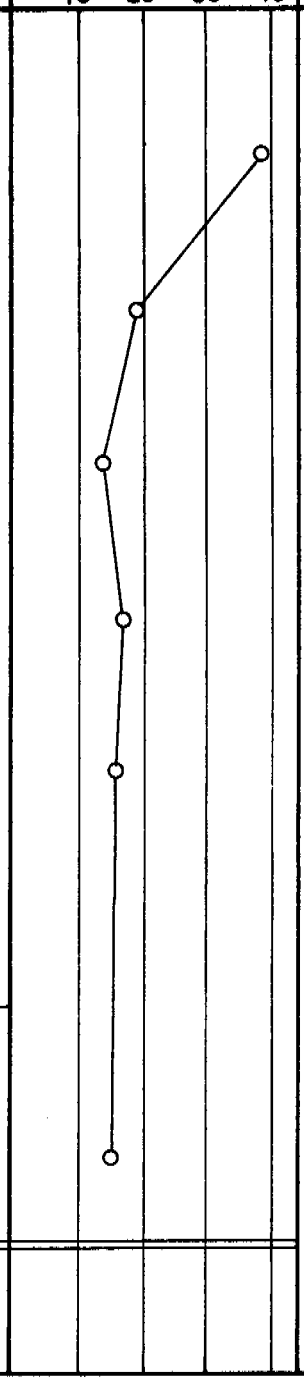
SPECIAL CONCERNS: Within Barren-Ground Caribou winter range. Straddles tributary to Point Lake. Aquatic values important.

F.F. SLANEY & COMPANY LIMITED
VANCOUVER, B. C.

GRANULAR MATERIALS INVENTORY - STAGE III

SITE NO. 1122 HOLE NO. 1 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION
1	PT	PEAT -fibrous, medium to dark brown -silty	NOT FROZEN
2, 3, 4, 5, 6, 7	ML	SILT -sandy, some fine gravel, -trace of clay, slight plasticity, grey-brown -increasing clay content	
8, 9, 10, 11, 12, 13, 14, 15	ML-SC / ML	SILT & SAND -some clay, trace to no gravel, fine to medium grained sand, low plasticity -increasing clay content, low to medium plasticity	FROZEN
16			
17		END OF HOLE	



DATE DRILLED: Sep.14/73 LOGGED BY: EBA 110-5 COMPLETION DEPTH: 16.0'

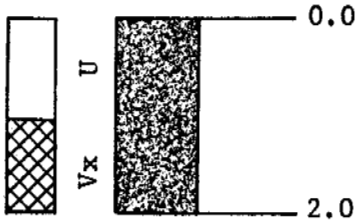
DRILLING METHOD: AUGER THAW DEPTH: 1.3'

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

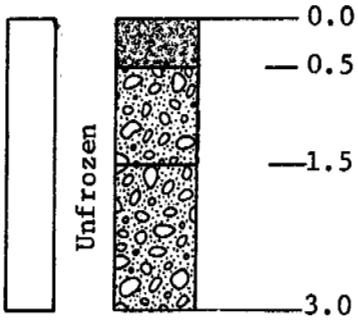
TEST PIT LOG

TP 1122-1



Peat, fibrous
dark brown

TP 1122-2



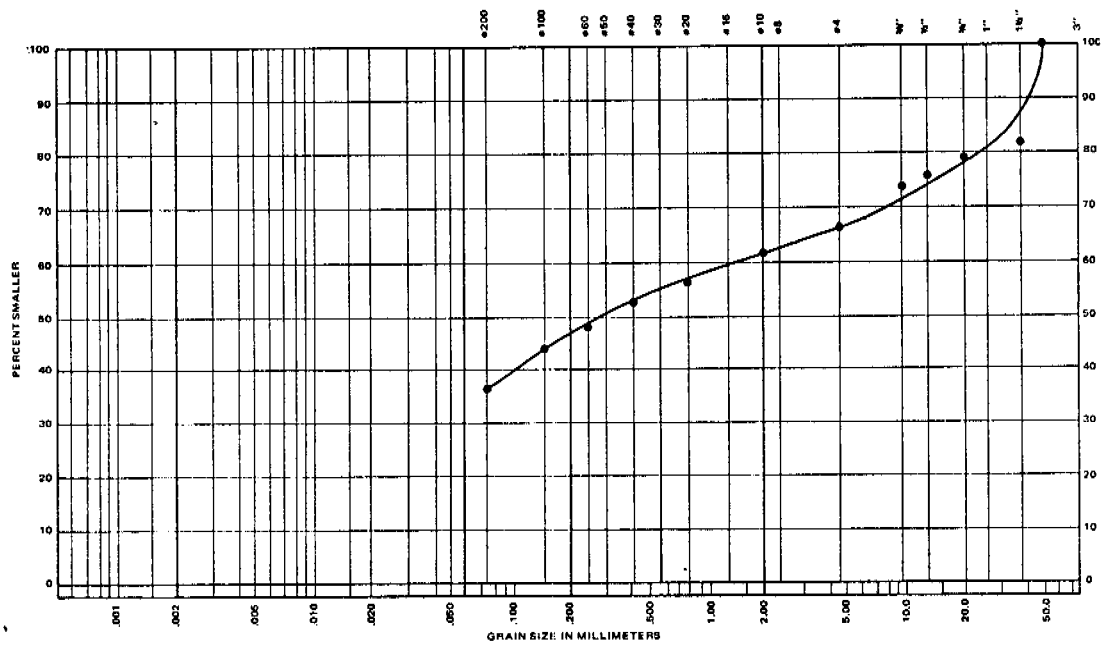
Moss

Gravel, black organic

Gravel, clayey
light grey
moist

33% GRAVEL
30% SAND
37% SILT & CLAY

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



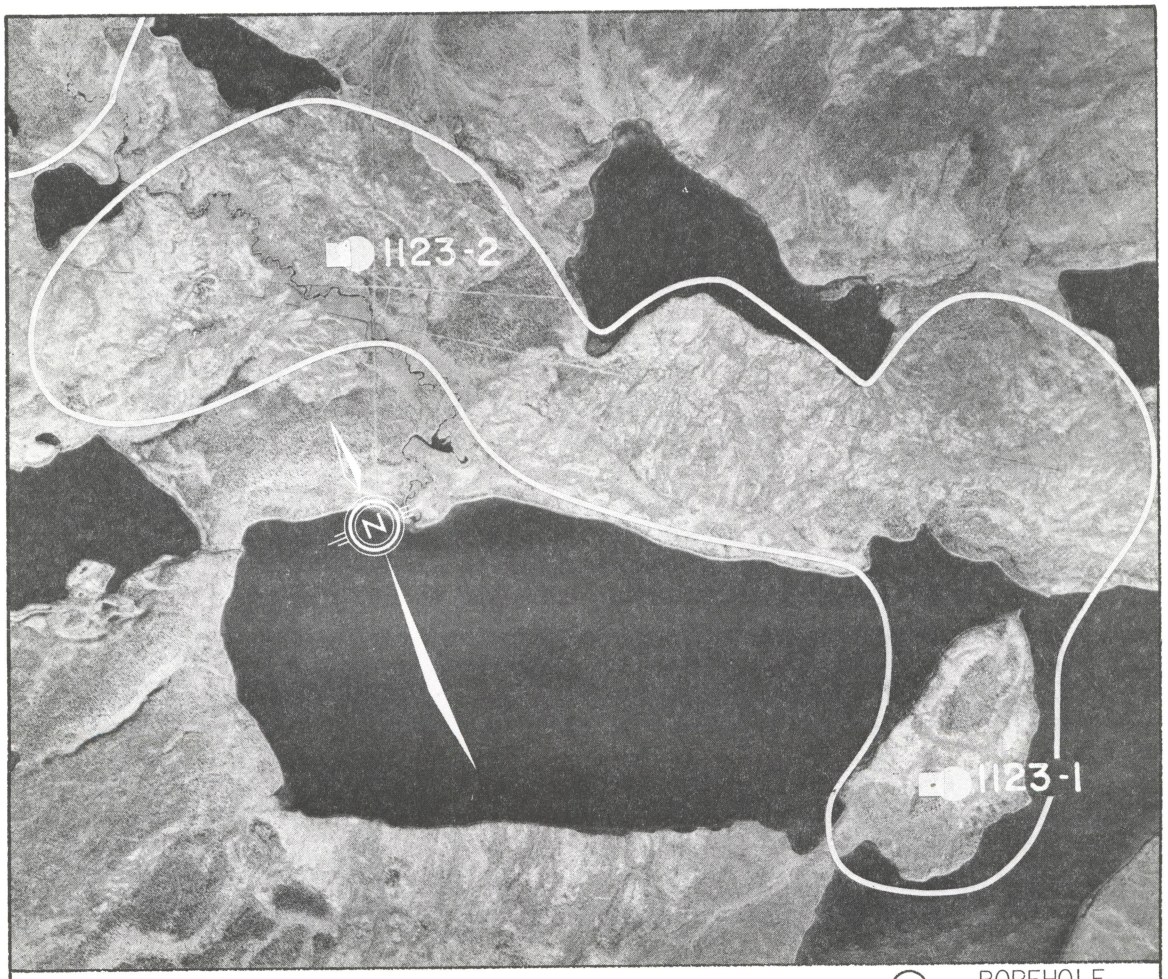
EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Silt and Gravel and Sand (SM) M/C = 17%

PROJECT Granular Resources
JOB No. E-666 DATE Oct. 16/73
SAMPLE No. TP 1122-2
DEPTH 3'

SITE 1123

Location:	Site 1123 is situated along the north shore of Point Lake. Proposed highway and pipeline routes are 13 and 18 miles south-west of the site respecitvely.
Geology:	Site 1123 is part of an extensive outwash deposit. Material within the site is expected to be quite uniform.
Material:	Gravel, sandy, trace silt, fairly well graded.
Volume:	2,200,000 cu. yd., estimate is realistic.
Area:	130 acres.

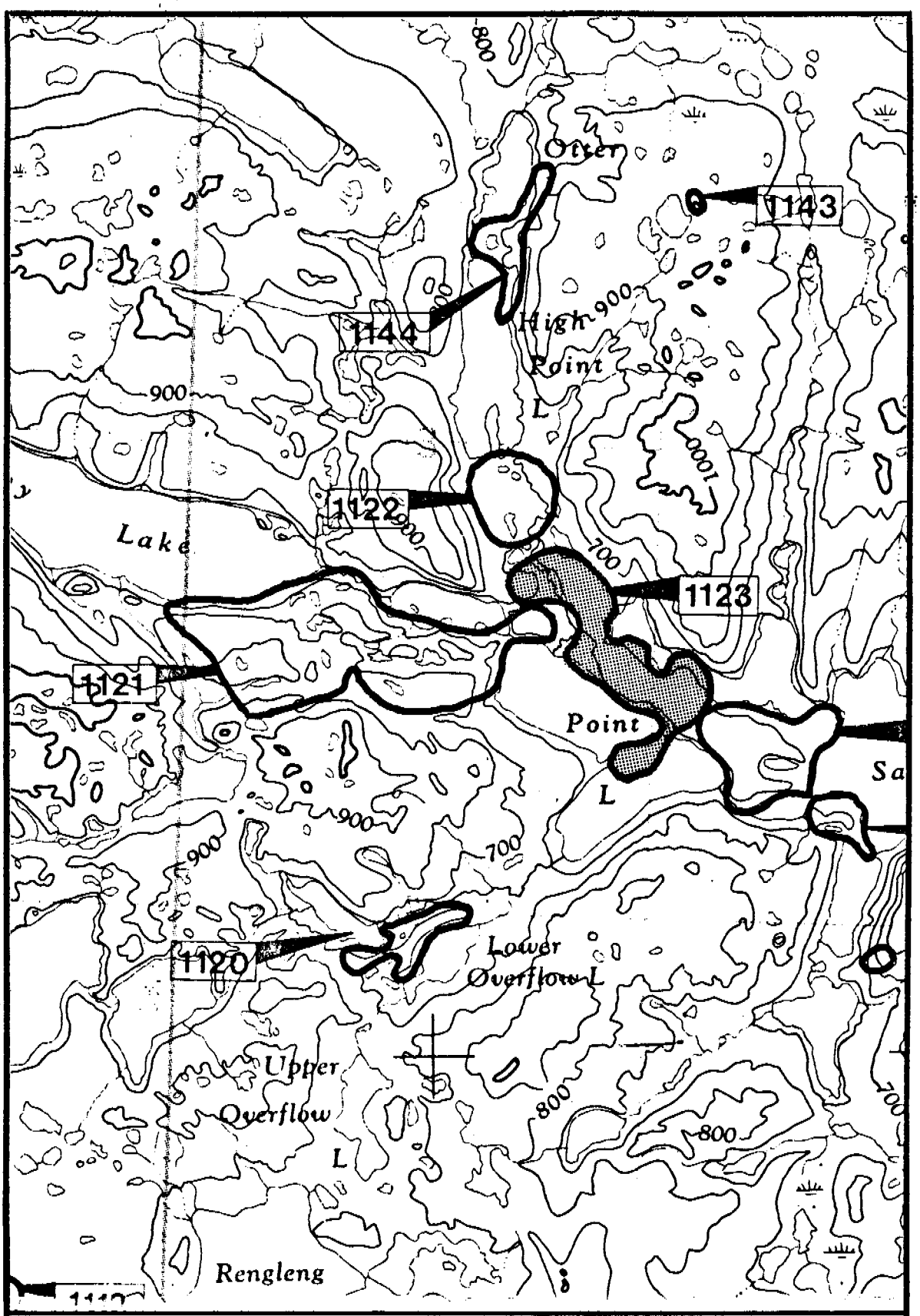


□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A23016-95 SCALE: 1" = 3000' (approx.)

Drainage: The site is well drained.

Assessment: A considerable quantity of good quality borrow is available at site 1123. Material suitable for processing into concrete aggregate is available from the site. Processing requirements will include screening the fraction above the 1/4 inch seive, washing it and, then crushing part of it to obtain a sand fraction. Overburden is negligible and vegetative cover sparse. The environmental overview has assessed the site a high sensitivity rating. Access to the site is not difficult but thermally sensitive terrain must be traversed thereby necessitating winter operations. Haulage distance to presently proposed construction sites is very long and unless materials are in very short supply it is unlikely that it will be feasible to develop the site. If, however, material shortages necessitate development, general borrow pit development guidelines are contained in this report.



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: ARTIC RED RIVER 106-N

SCALE: 1:125,000

SITE 1123

ENVIRONMENTAL SENSITIVITY INDEX

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	TERRAIN 1 2 3 4 5 Rating: 5	Formation Stability Ice Content	Flat Land, Terrace, Knoll, Rolling, Outcrop, Ridge, Scarp, Overburden Type & Depth, Wet Site, Dry Site.
5	VEGETATION 1 2 3 4 5 Rating: 10	Aesthetic Value Habitat Value	Marsh Black Spruce Muskeg White Spruce Mixed Conifer Conifer - Deciduous Deciduous Dry Slopes Riparian
15	MAMMALS 1 2 3 4 5 Rating: 45	Ungulates Furbearers Carnivores Small Mammals	Winter Range, Summer Range, Migration Route, Denning Area, Dams and Lodges, Special Habitat Use.
10	BIRDS 1 2 3 4 5 Rating: 40	Waterfowl-Swans, Geese, Ducks Game Birds Raptors Shorebirds Passerine	Migration Pathway, Moulting, Spring Staging, Fall Staging, Nesting-Brooding, Perching, Winter Habitat.
10	FISHERY 1 2 3 4 5 Rating: 50	Lakes, Tributaries Mackenzie River: Whitefish, Grayling, Pike, Trout-Perch, Lake Trout, Burbot, Suckers, Stickleback Smelt, Sculpin, Goldeye, Chub, Dace, Walleye, Char, Cisco	Spawning, Nursery, Feeding, Overwintering. Major Migration Route. Siltation of Spawning Areas, Benthic Communities, Toxic Material Spill, Slumps, Velocity Increments, Migration Barriers, Eutrophication, Blasting.

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	ARCHAEOLOGY 1 2 3 4 5 Rating: 15	Paleontology Pre-Historic Historic	Probability of Discovery. Low, Medium, High. Known Sites.
10	AESTHETICS 1 2 3 4 5 Rating: 20	Visible from: Physical Disturbance	River, Highway, Air. Dust, Waste, Stockpiles, Noises.
15	RESOURCE UTILIZATION 1 2 3 4 5 Rating: 60	Fort Good Hope Arctic Red R. Inuvik	Improved Access, Traplines, Hunting, Fishing, Domestic, Commercial.
15	ASSOCIATED DISTURBANCES 1 2 3 4 5 Rating: 75	Access Roads Miles From Highway Miles From Pipeline Hydrologic Alterations Continued Use For Maintenance.	0-2, 2-5, 5-10, 10+ 0-2, 2-5, 5-10, 10+ Cuts and Fills, Creek Crossings, Compaction, Slumping, Erosion. Stockpiles, Waste, Dust.
10	RESTORATION 1 2 3 4 5 Rating: 30	Soil Stabilization Visual Improvement Habitat Replacement	Natural Regeneration, Grass-Legume Seeding, Transplants, Sustained Maintenance, Erosion Control Systems.

R.I.R. - Relative Importance Units - Base of 100 units.

NOTE: SENSITIVITY INDEX RANGE

MINIMAL SENSITIVITY		MAXIMUM SENSITIVITY
100	TO	500

TOTAL INDEX: 350

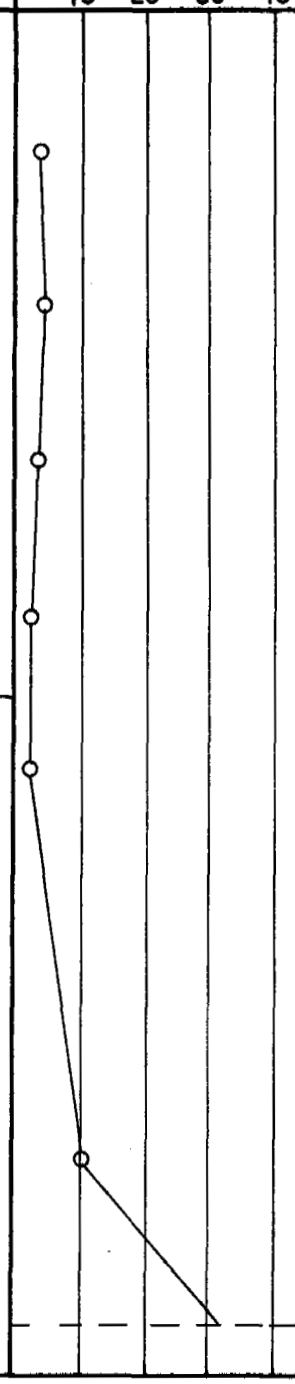
SPECIAL CONCERNS: Along north and east shores of Point Lake. Within winter range for Barren-Ground Caribou. Shoreline buffers, siltation controls and winter operations recommended.

F.F. SLANEY & COMPANY LIMITED
VANCOUVER, B. C.

GRANULAR MATERIALS INVENTORY - STAGE III

SITE NO. 1123 HOLE NO. 1 PAGE 1 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION
1	GP-GM	GRAVEL, sandy -trace silt, gap graded, subrounded to subangular, maximun 3", average 1" - 1½", sand is medium to fine grained, dry, light brown.	NOT FROZEN
2			
3			
4			
5			
6			
7		(6' - 10') 79% GRAVEL 14% SAND 7% SILT & CLAY	
8			
9			FROZEN
10			
11	SM	SAND, silty -some gravel, trace clay low plasticity, medium brown	
12			
13			
14			
15			
16			
17			



DATE DRILLED: Sep. 14/73 LOGGED BY: EBA 110-3 COMPLETION DEPTH: 19.0'

DRILLING METHOD: AUGER THAW DEPTH: 9.0'

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1123 HOLE NO. 1 PAGE 2 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
18	CL	CLAY: -some silt, low to medium plasticity, grey		56	18
19		END OF HOLE			19
20					20
21					21
22					22
23					23
24					24
25					25
26					26
27					27
28					28
29					29
30					30
31					31
32					32
33					33
34					34

DATE DRILLED: Sep. 14/73 LOGGED BY: EBA 110-3 COMPLETION DEPTH: 19.0'

DRILLING METHOD: AUGER THAW DEPTH: 9.0'

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

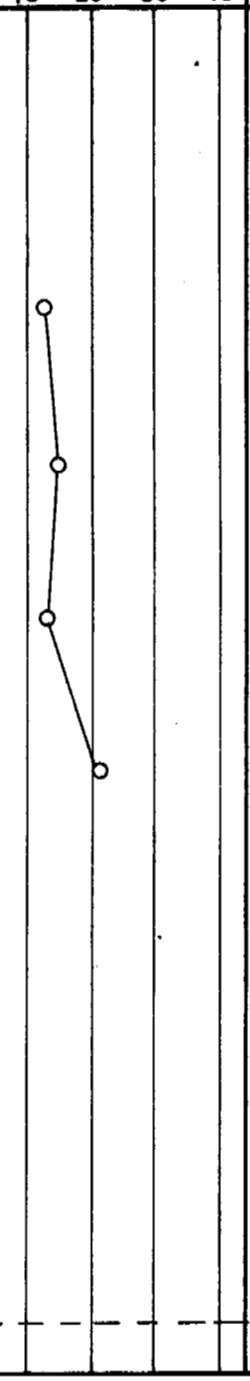
EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1123 HOLE NO. 2 PAGE 1 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION
1	Pt	PEAT	NOT FROZEN
2	GM	GRAVEL -silty, sandy, well graded fine gravel, angular and subangular, average ½", very wet, light brown	
3			
4			
5			
6	SM	-very, very wet, slightly increasing silt content	
7			
8			
9		(4' - 10') 34% GRAVEL, 45% SAND, 21% SILT & CLAY	
10			
11			
12	CL	CLAY -silty, some sand, some -fine gravel, brown-grey.	Nbn
13			
14			
15			
16			
17			

MOISTURE CONTENT %



DEPTH (feet): 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

DATE DRILLED: Sep. 19/73 | LOGGED BY: EBA 110-6 | COMPLETION DEPTH: 20.0'

DRILLING METHOD: AUGER | THAW DEPTH: 12.0'

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1123 HOLE NO. 2 PAGE 2 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
18		CLAY	Nbn		18
		-same			
19	CL				19
20					20
21		END OF HOLE			21
22					22
23					23
24					24
25					25
26					26
27					27
28					28
29					29
30					30
31					31
32					32
33					33
34					34

DATE DRILLED: Sep. 19/73 LOGGED BY: EBA 110-6 COMPLETION DEPTH: 20.0'

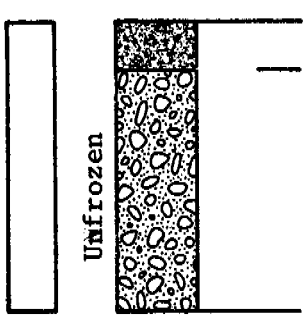
DRILLING METHOD: AUGER THAW DEPTH: 12.0'

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

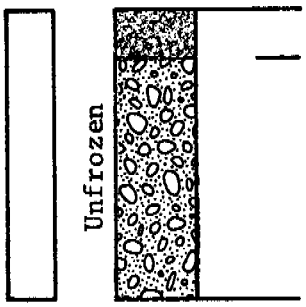
TEST PIT LOG

TP 1123-1



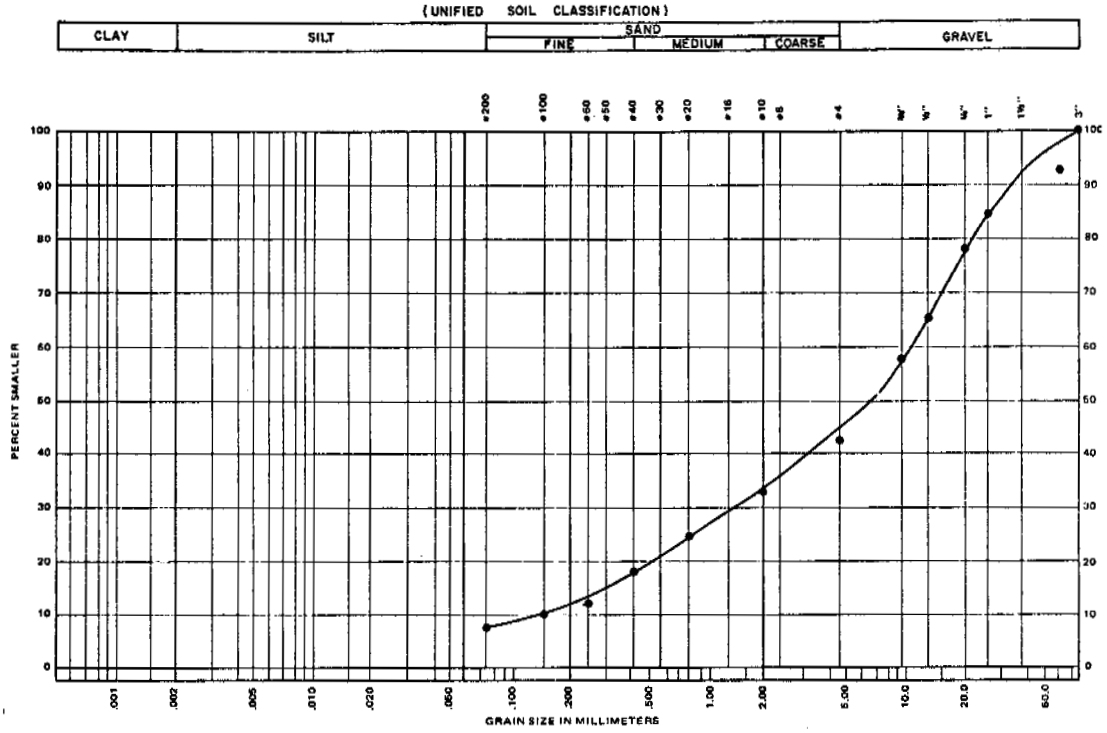
0.0	Peat		
0.5	Sandy gravel	light brown well graded	57% GRAVEL 36% SAND 7% SILT & CLAY
3.0			

TP 1123-2



0.0	Moss		
0.5	Gravel, well graded light brown moist		45% GRAVEL 20% SAND 35% SILT & CLAY
3.0			

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

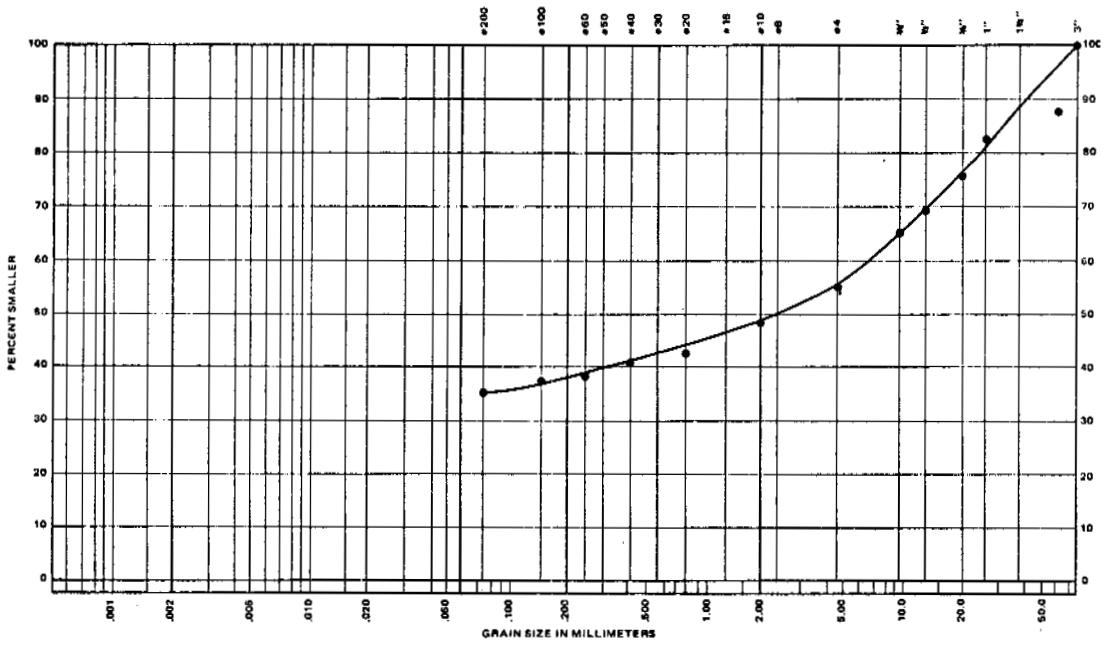


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Sand and Gravel With Trace of Silt (GW GM)

PROJECT Granular Resources
JOB No. E-666 DATE
SAMPLE No. TP 1123-1
DEPTH 3'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

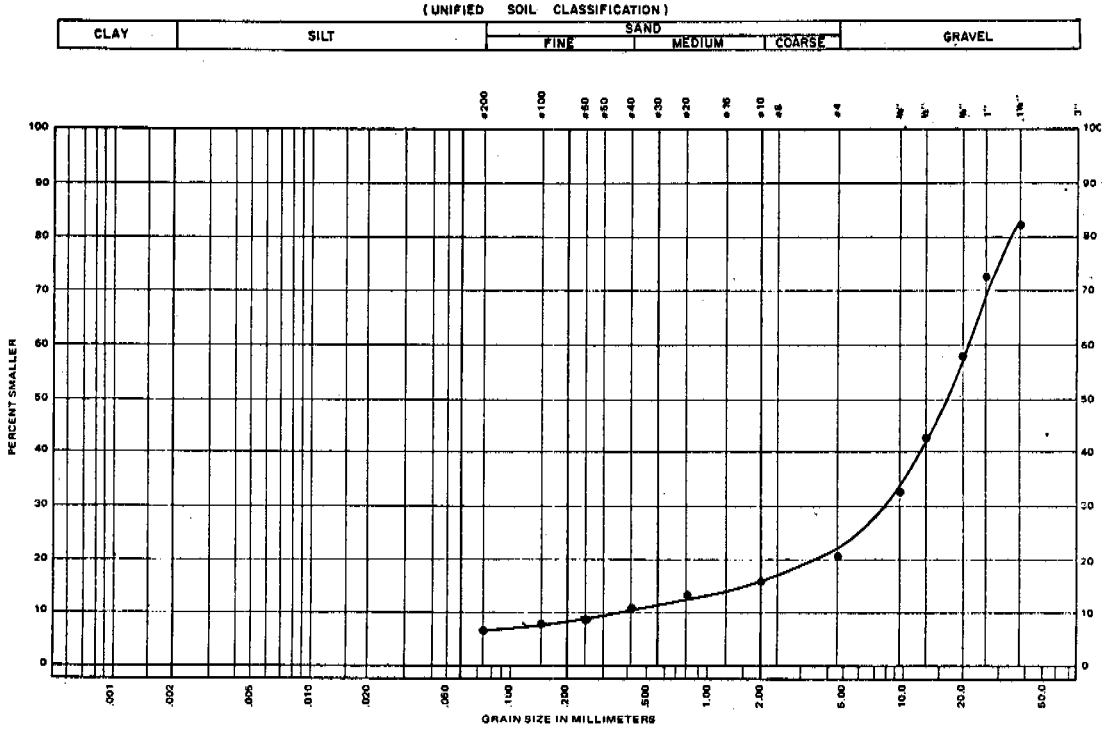


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Sandy Silt and Gravel (GM) M/C = 8.6%

PROJECT Granular Resources
JOB No. E-666 DATE
SAMPLE No. TP 1123-2
DEPTH 3'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

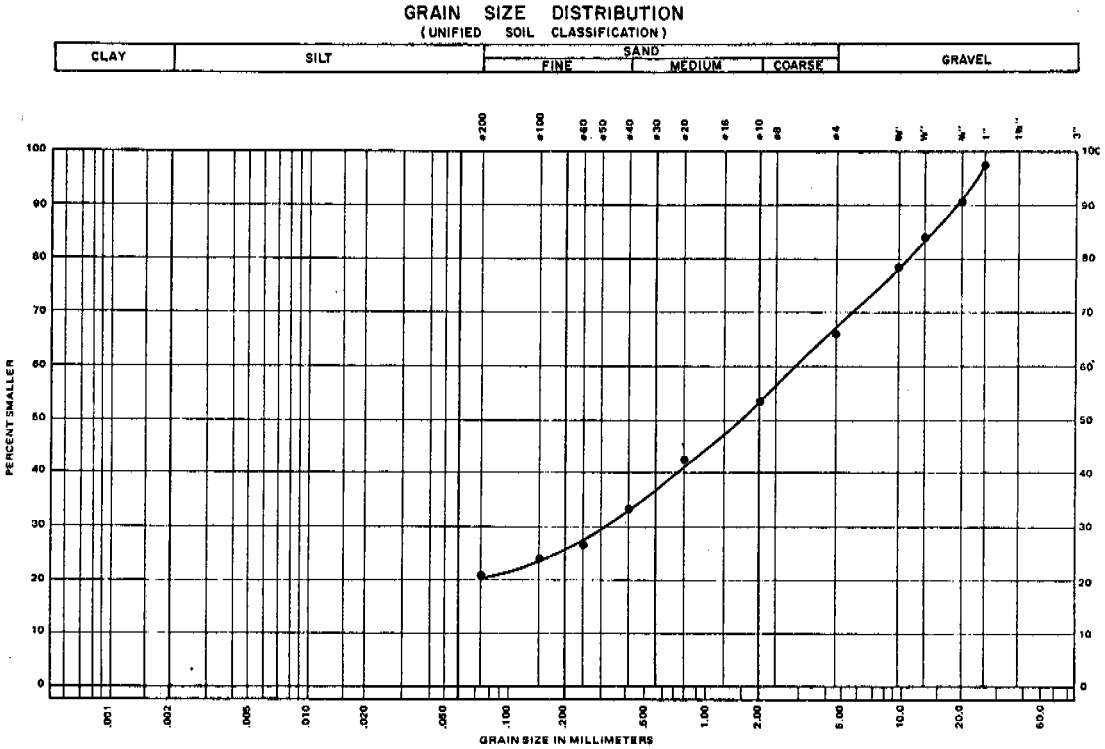


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Gravel and Some Sand With A Trace of Silt (GP GM)

PROJECT Granular Resources
JOB No. E-666 DATE Oct. 10/73
SAMPLE No. BH 1123-1
DEPTH 6' - 10'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Silty Sand and Gravel (SM)

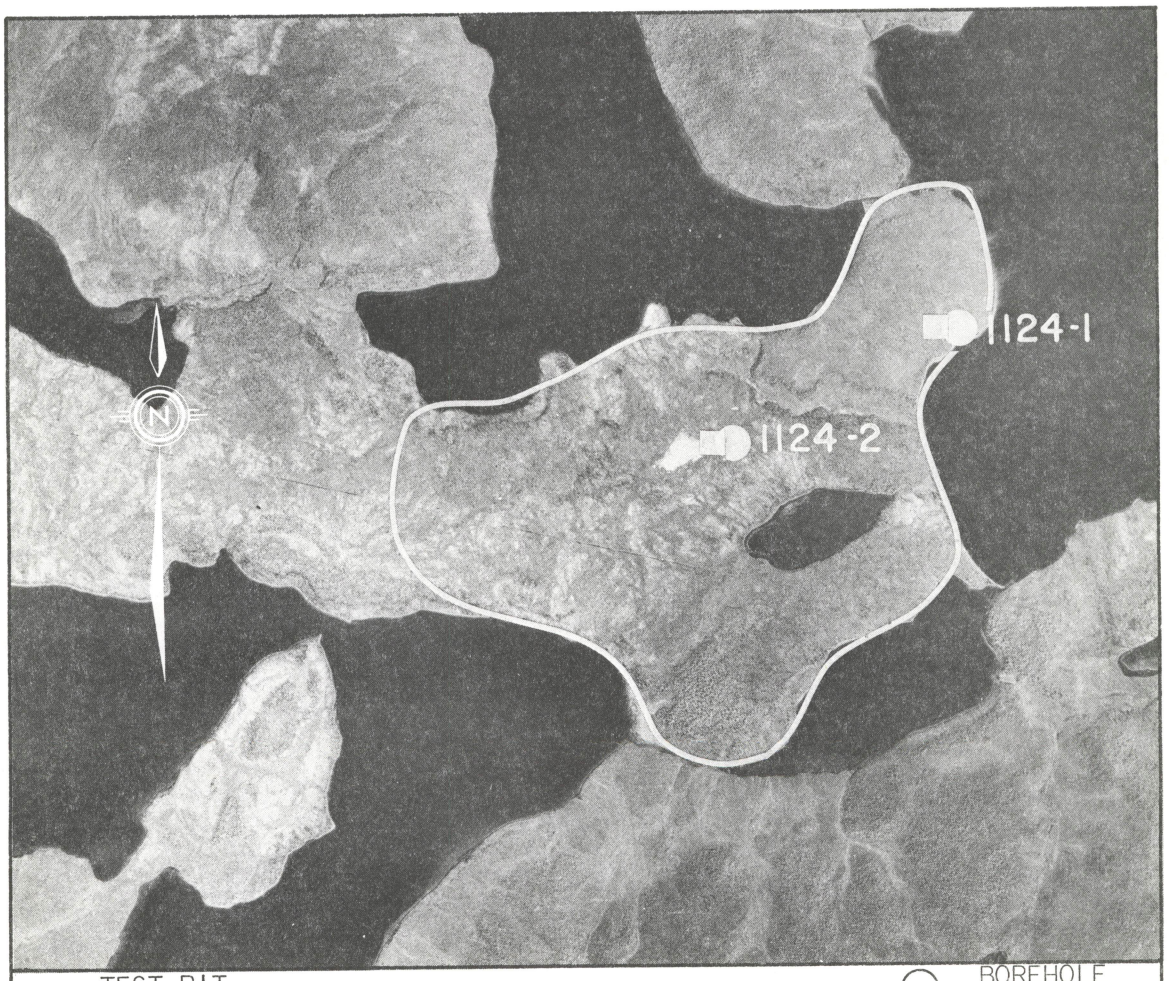
PROJECT Granular Resources
JOB No. E-666 DATE Nov. 6/73
SAMPLE No. BH 1123-2
DEPTH 4' - 10'

PETROGRAPHIC ANALYSIS

Limestone	10%
Dolonite	3%
Sandstone	56%
Shale	5%
Quartz	2%
Chert	2%
Quartzite	4%
Ironstone	1%
Granite	3%
Basalt	13%
Others	1%

SITE 1124a

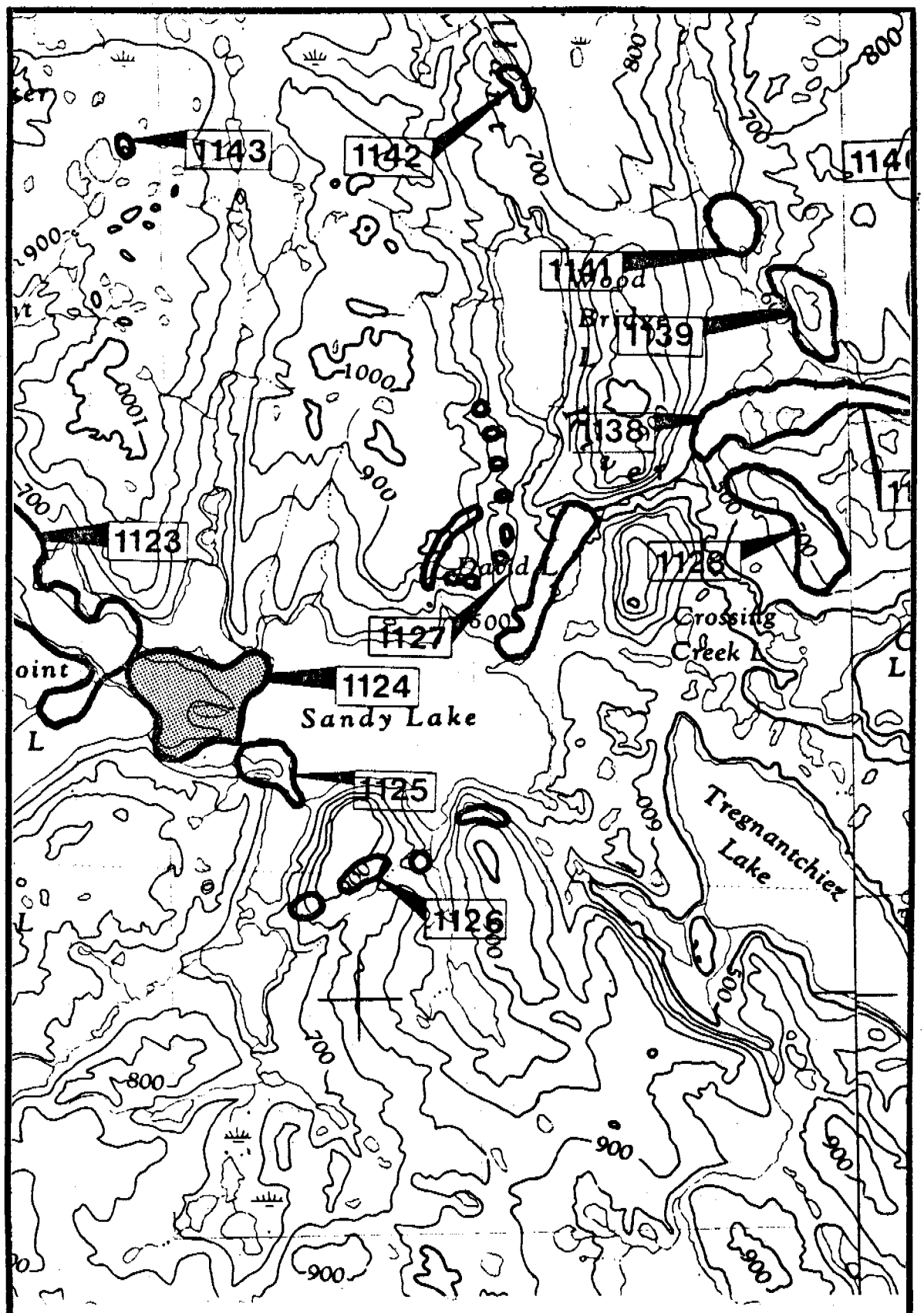
Location:	Site 1124 is situated between Sandy Lake and Point Lake. Proposed highway and pipeline routes are 13 and 17 miles south-west of the site respectively.
Geology:	Site 1126 is part of an extensive outwash deposit. Material at the site is variable in composition.
Material:	Silty sand and gravel, well graded.
Volume:	10,600,000 cu. yd., estimate is realistic.
Area:	550 acres.
Drainage:	The site is poorly drained.



□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A23016-94 SCALE: 1" = 3000' (approx.)

Assessment: A very large volume of fair to poor quality material was encountered at site 1124. Much of the material in this deposit appears to be only marginally suitable for use in construction. The site has a large aerial extend but the borrow material is thin which would lead to excessive stripping during development. Overburden of peat, silt and clay a few feet thick would have to be stripped and stockpiled for use in restoration. Tree cover, however, is very sparse. Permafrost was encountered at a depth of 2 feet. The site has a high environmental sensitivity rating. Haulage distance to presently located construction sites is very long and access is expected to be relatively difficult because of hilly and thermally sensitive terrain. Winter operations will be necessary. Unless materials are in very short supply the long haulage distance, relatively difficult access and their layer of borrow material render the site unfeasible for development.



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: TRAVAILLANT LAKE 106-O
ARTIC RED RIVER 106-N

SCALE: 1:125,000

SITE 1124

ENVIRONMENTAL SENSITIVITY INDEX

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	TERRAIN 1 (2) 3 4 5 Rating: 10	Formation Stability Ice Content	Flat Land, Terrace, Knoll, Rolling, Outcrop, Ridge, Scarp, Overburden Type & Depth, Wet Site, Dry Site.
5	VEGETATION 1 2 (3) 4 5 Rating: 15	Aesthetic Value Habitat Value	Marsh Black Spruce Muskeg White Spruce Mixed Conifer Conifer - Deciduous Deciduous Dry Slopes Riparian
15	MAMMALS 1 2 (3) 4 5 Rating: 45	Ungulates Furbearers Carnivores Small Mammals	Winter Range, Summer Range, Migration Route, Denning Area, Dams and Lodges, Special Habitat Use.
10	BIRDS 1 2 (3) 4 5 Rating: 30	Waterfowl-Swans, Geese, Ducks Game Birds Raptors Shorebirds Passerine	Migration Pathway, Moulting, Spring Staging, Fall Staging, Nesting-Brooding, Perching, Winter Habitat.
10	FISHERY 1 2 3 (4) 5 Rating: 40	Lakes, Tributaries Mackenzie River: *Whitefish Grayling Pike Trout-Perch Lake Trout Burbot Suckers Stickleback Smelt Sculpin Goldeye Chub Dace Walleye Char Cisco	Spawning, Nursery, Feeding, Overwintering. Major Migration Route. Siltation of Spawning Areas, Benthic Communities. Toxic Material Spill. Slumps, Velocity Increments, Migration Barriers. Eutrophication. Blasting.

R.I.R. - Relative Importance Units - Base of 100 units.

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	ARCHAEOLOGY 1 2 (3) 4 5 Rating: 15	Paleontology Pre-Historic Historic	Probability of Discovery. Low, Medium, High. Known Sites.
10	AESTHETICS 1 (2) 3 4 5 Rating: 20	Visible from: Physical Disturbance	River, Highway, Air. Dust, Waste, Stockpiles. Noises.
15	RESOURCE UTILIZATION 1 2 3 4 (5) Rating: 75	Fort Good Hope Arctic Red R. Inuvik	Improved Access. Traplines. Hunting. Fishing. Domestic. Commercial.
15	ASSOCIATED DISTURBANCES 1 2 3 4 (5) Rating: 75	Access Roads Miles From Highway Miles From Pipeline Hydrologic Alterations Continued Use For Maintenance.	0-2, 2-5, 5-10, 10+ 0-2, 2-5, 5-10, 10+ Cuts and Fills. Creek Crossings. Compaction. Slumping, Erosion. Stockpiles. Waste, Dust.
10	RESTORATION 1 2 (3) 4 5 Rating: 30	Soil Stabilization Visual Improvement Habitat Replacement	Natural Regeneration. Grass-Legume Seeding. Transplants. Sustained Maintenance. Erosion Control Systems.

NOTE: SENSITIVITY INDEX RANGE

MINIMAL SENSITIVITY		MAXIMUM SENSITIVITY
100	TO	500

TOTAL INDEX: 355

SPECIAL CONCERNS: Straddles drainage system between Point and Sandy Lakes. Area utilized by Whistling Swans during spring staging (May 10-June 20), and during moulting. Winter operations, buffer zones, siltation controls and provision of fish migration passage are recommended.

F.F. SLANEY & COMPANY LIMITED
VANCOUVER, B. C.

GRANULAR MATERIALS INVENTORY - STAGE III

SITE NO. 1124 HOLE NO. 1 PAGE 1 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
1	Pt	PEAT -silty, fibrous, brown	UNFROZEN		1
2	CL	CLAY & SILT -trace to some sand, medium plasticity, grey-brown	FROZEN		2
3					3
4	SM	SAND -silty, some gravel, well graded fine to coarse sand and fine gravel, light brown			4
5					5
6		-trace of clay, slight plasticity			6
7					7
8		(4') 23% GRAVEL 56% SAND 21% SILT & CLAY			8
9					9
10	SM	SAND & SILT -trace to some fine gravel, trace clay, medium to coarse grained sand, slight plasticity, grey-brown (10')	15% GRAVEL 54% SAND 31% SILT & CLAY		10
11					11
12					12
13					13
14	CL	CLAY -sand, medium-fine grained, medium plasticity, brown-grey to grey.			14
15					15
16					16
17					17

DATE DRILLED: Sep. 15/73 LOGGED BY: EBA 110-4 COMPLETION DEPTH: 19.0'

DRILLING METHOD: AUGER THAW DEPTH: 2.0'

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1124 HOLE NO. 1 PAGE 2 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
18	CL	CLAY -sandy, medium-fine grained			18
19		END OF HOLE			19
20					20
21					21
22					22
23					23
24					24
25					25
26					26
27					27
28					28
29					29
30					30
31					31
32					32
33					33
34					34

DATE DRILLED: Sep. 15/73

LOGGED BY: EBA 110-4

COMPLETION DEPTH: 19.0'

DRILLING METHOD: AUGER

THAW DEPTH: 2.0'

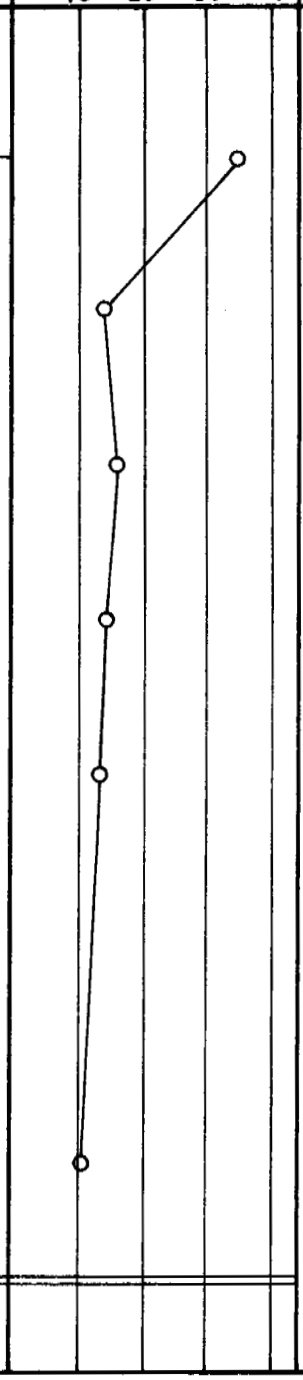
GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1124 HOLE NO. 2 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION
1	PT-OL	PEAT & ORGANIC SILT fibrous, dark brown	NOT FROZEN
2	GM	GRAVEL -very silty, sandy, medium to light brown-grey	FROZEN
3			
4	ML	SILT -sandy, some to little gravel, trace of clay, slight plasticity, brown-grey.	
5			
6			
7			
8			
9			
10		- sand well graded, fine to coarse	
11			
12			
13			
14			
15			
16			
17		END OF HOLE	



DATE DRILLED: Sep. 19/73 LOGGED BY: EBA 110-7 COMPLETION DEPTH: 16.5'

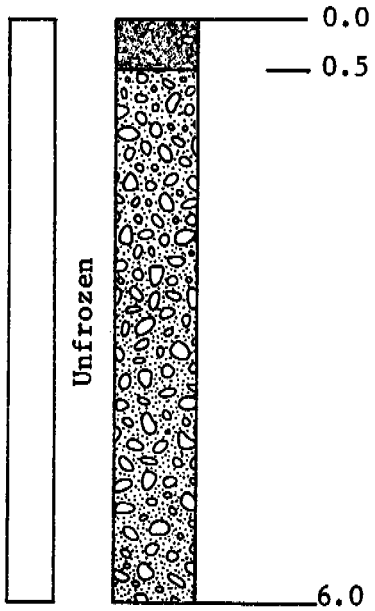
DRILLING METHOD: AUGER THAW DEPTH: 2.0'

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

SURFACE EXPOSURE LOG

TP 1124-1



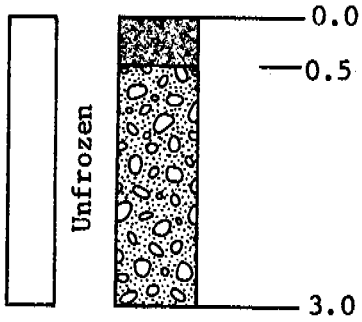
Moss

Sandy gravel

65% GRAVEL
33% SAND
2% SILT & CLAY

TEST PIT LOG

TP 1124-2

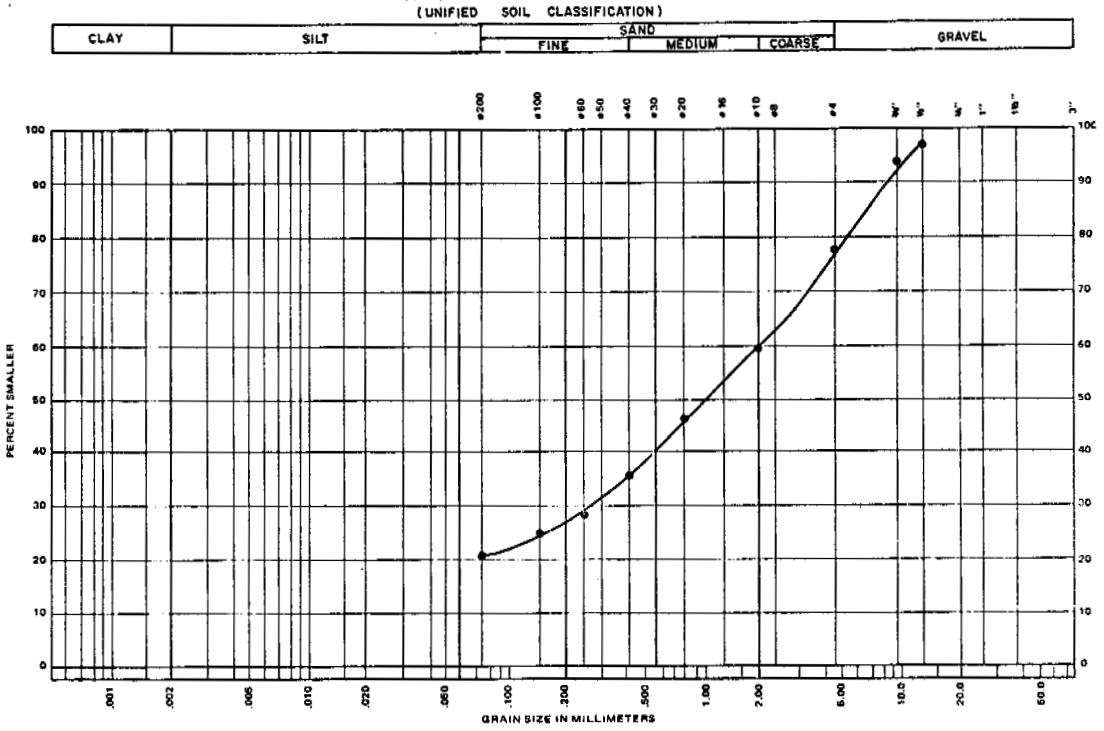


Moss

Gravel, black
organics
wet
medium grey
well graded

51% GRAVEL
33% SAND
10% SILT & CLAY

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

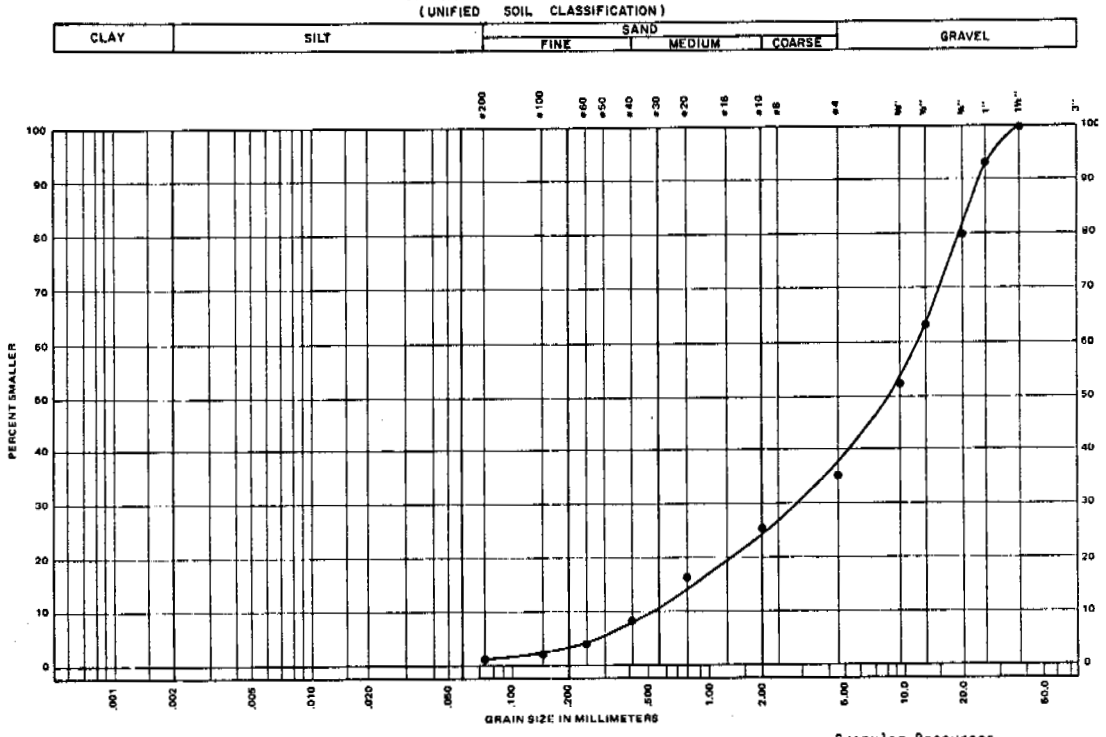


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Silty Gravelly Sand (SM)

PROJECT Granular Resources
JOB No. E-666 DATE Oct/73
SAMPLE No. BH 1124-1
DEPTH 4'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

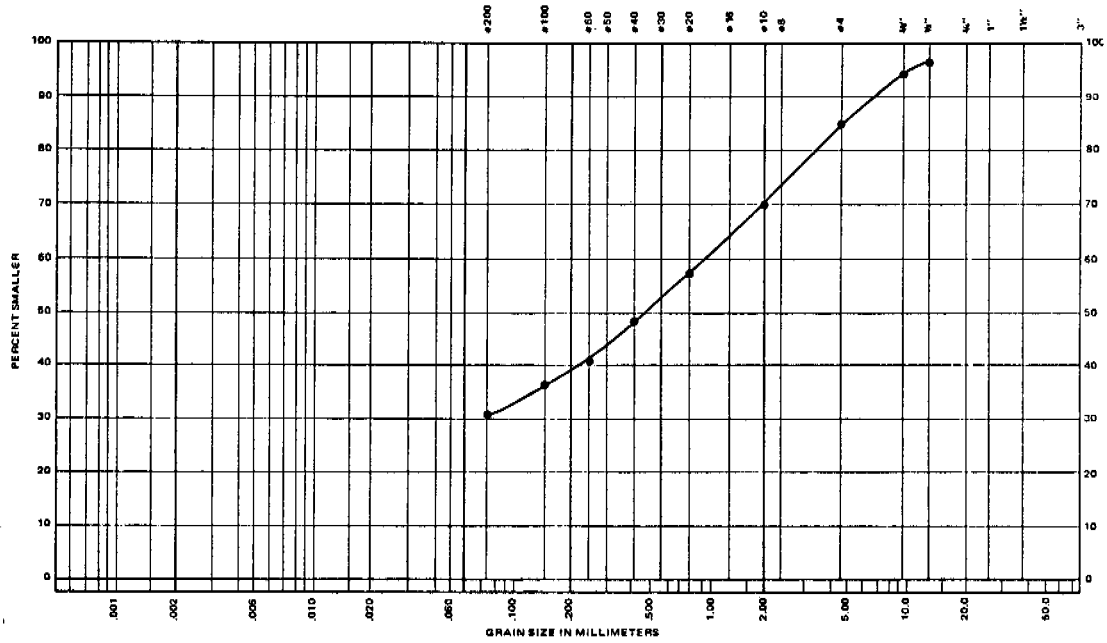


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Sand and Gravel With a Trace of Silt (GW) M/C=7% (GW).

PROJECT Granular Resources
JOB No. E-666 DATE
SAMPLE No. TP 1124-1
DEPTH 6'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

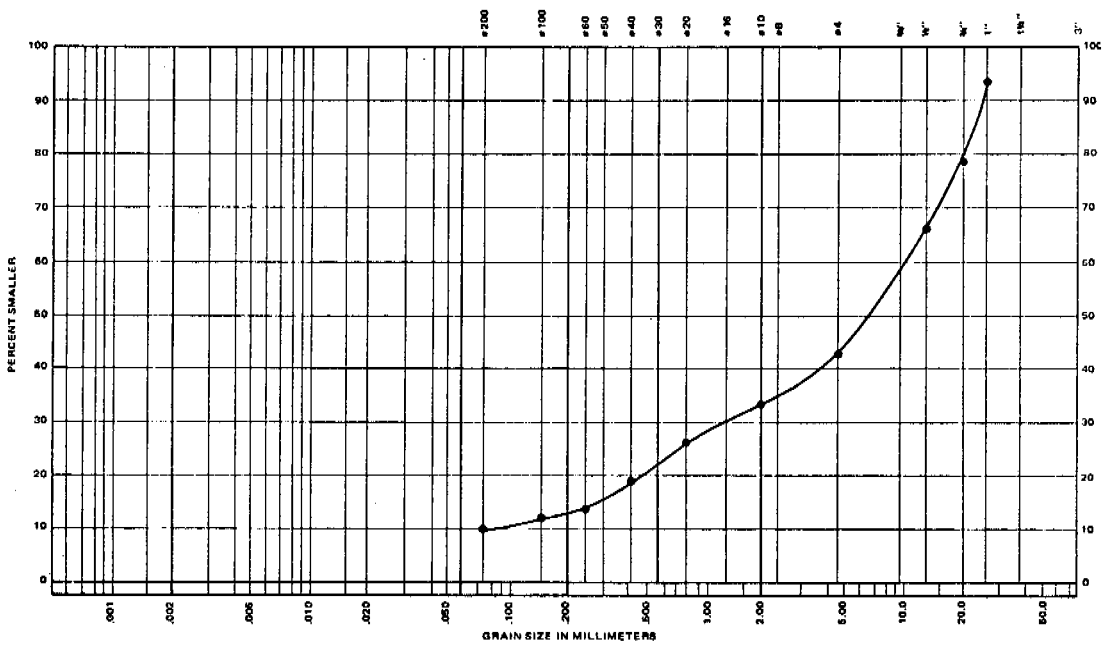


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Sand and Silt and Some Gravel (SM)

PROJECT Granular Resources
JOB No. E-666 DATE Nov. 10/73
SAMPLE No. BH 1124-1
DEPTH 10'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



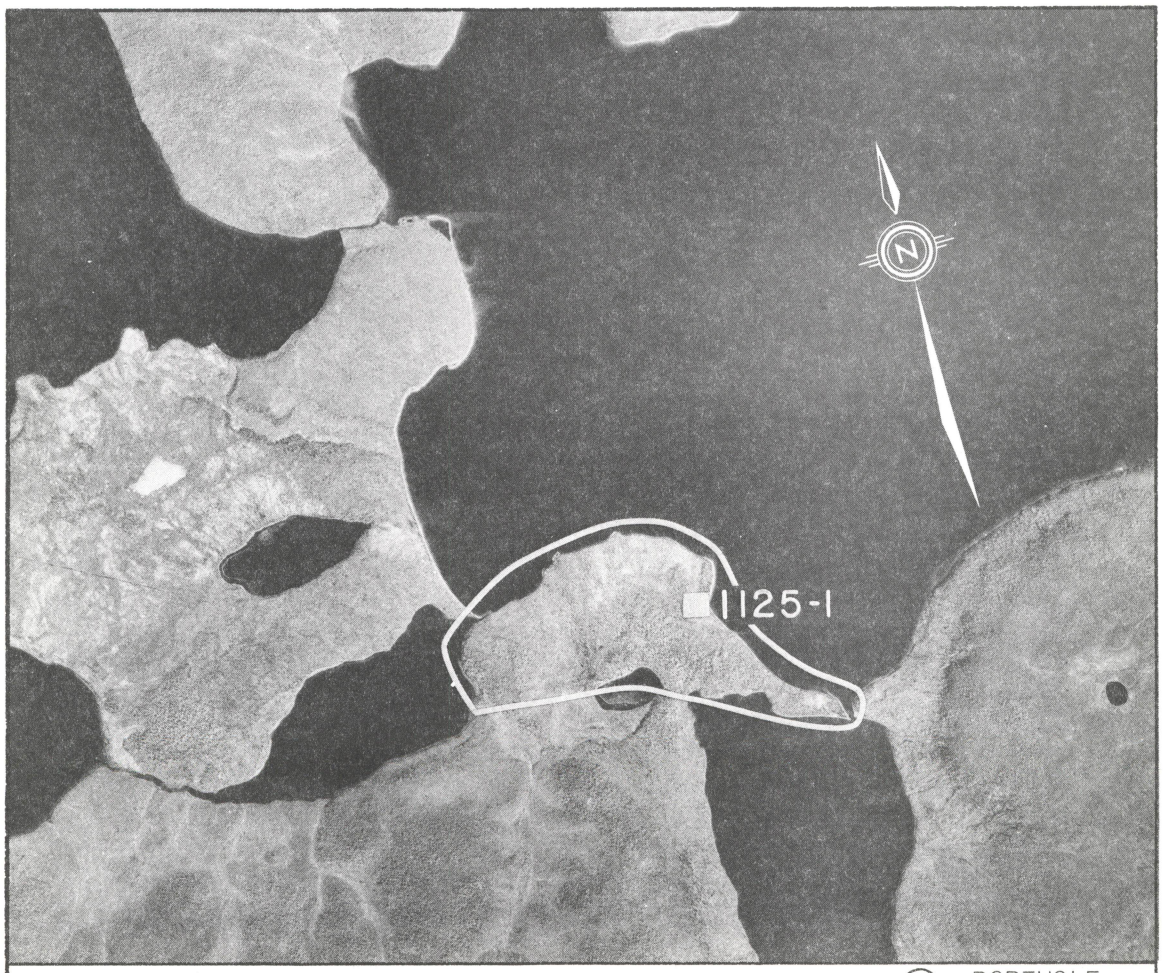
EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Gravel and Sand and Some Silt (GW) M/C = 9.4%

PROJECT Granular Resources
JOB No. E-666 DATE Nov. 7/73
SAMPLE No. TP 1124-2
DEPTH 3'

SITE 1125

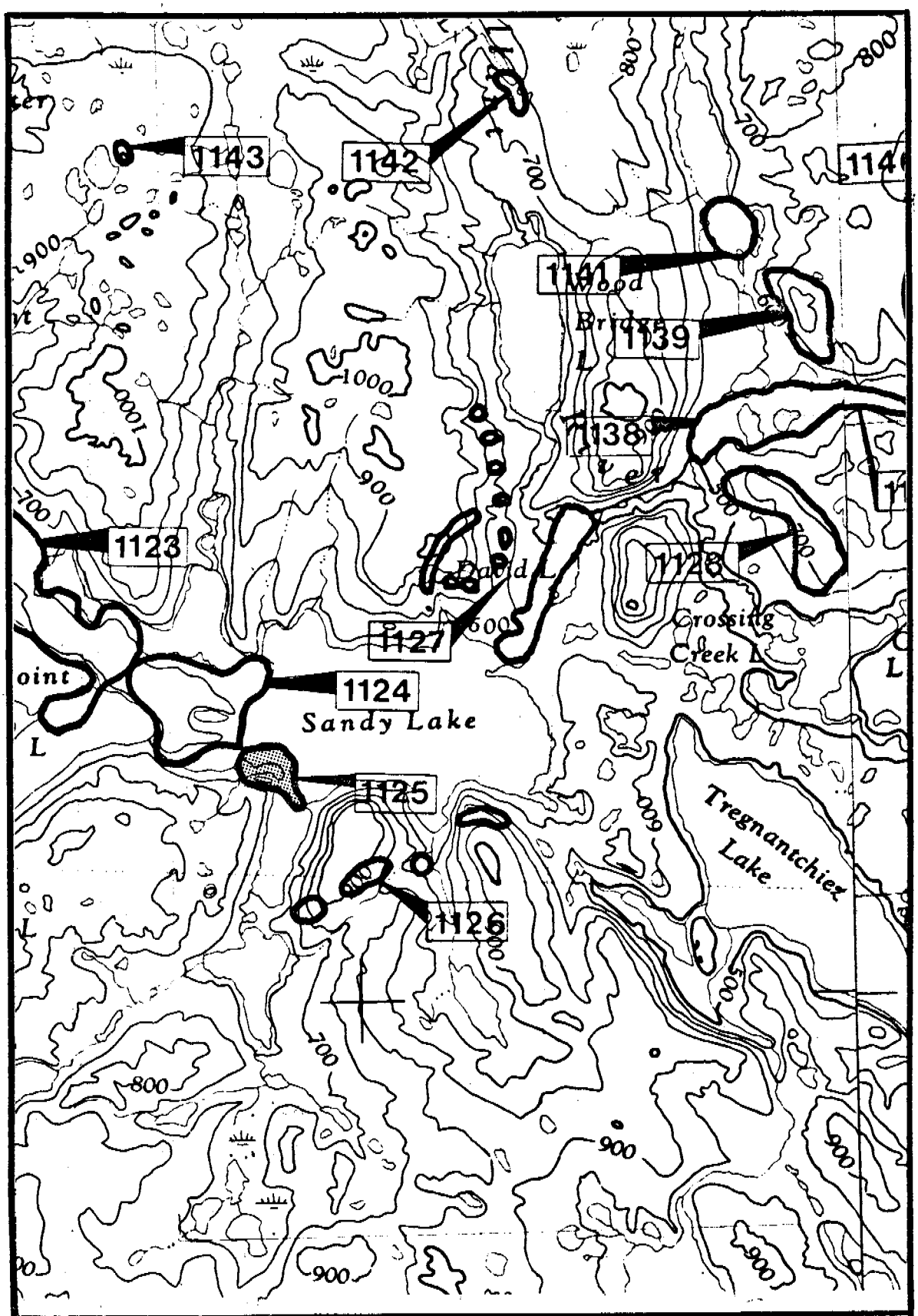
Location:	Site 1125 is situated along the south shore of Sandy Lake. The proposed highway is 13 miles south-west of the site and the proposed pipeline is 17 miles south-west of the site.
Geology:	Site 1125 is part of an extensive outwash deposit. The material at the site is expected to be quite uniform.
Material:	Gravel and sand, some silt, well graded.
Area:	200 acres.
Drainage:	The site is well drained.



□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A23016-93 SCALE: 1" = 3000' (approx.)

Assessment: Test pit data indicates the site to be a potential source for a reasonably large quantity of fair to good quality borrow. Drilling will be necessary to prove the quantity and quality of material. Access is difficult because of hilly and thermally sensitive terrain and haulage distance to proposed construction sites is very long. Moreover, the site has a high environmental sensitivity rating. The long haulage distance renders development of the site unfeasible at the moment. If, however, material shortages necessitate development, general borrow pit development guidelines are contained in this report.



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: TRAVAILLANT LAKE 106-O
ARTIC RED RIVER 106-N

SCALE: 1:125,000

SITE 1125

ENVIRONMENTAL SENSITIVITY INDEX

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	TERRAIN 1 2 (3) 4 5 Rating: 15	Formation Stability Ice Content	Flat Land, Terrace, Knoll, Rolling, Outcrop, Ridge, Scarp, Overburden Type & Depth, Wet Site, Dry Site.
5	VEGETATION 1 2 (3) 4 5 Rating: 15	Aesthetic Value Habitat Value	Marsh Black Spruce Muskeg White Spruce Mixed Conifer Conifer - Deciduous Deciduous Dry Slopes Riparian
15	MAMMALS 1 2 (3) 4 5 Rating: 45	Ungulates Furbearers Carnivores Small Mammals	Winter Range, Summer Range, Migration Route, Denning Area, Dams and Lodges, Special Habitat Use.
10	BIRDS 1 2 (3) 4 5 Rating: 30	Waterfowl-Swans, Geese, Ducks Game Birds Raptors Shorebirds Passerine	Migration Pathway, Moulting, Spring Staging, Fall Staging, Nesting-Brooding, Perching, Winter Habitat.
10	FISHERY 1 2 3 (4) 5 Rating: 40	Lakes, Tributaries Mackenzie River: Whitefish, Grayling, Pike, Trout-Perch, Lake Trout, Burbot, Suckers, Stickleback Smelt, Sculpin, Goldeye, Chub, Dace, Walleye, Char, Cisco	Spawning, Nursery, Feeding, Overwintering. Major Migration Route. Siltation of Spawning Areas, Benthic Communities, Toxic Material Spill, Slumps, Velocity Increments, Migration Barriers, Eutrophication, Blasting.

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	ARCHAEOLOGY 1 2 (3) 4 5 Rating: 15	Paleontology Pre-Historic Historic	Probability of Discovery. Low, Medium, High. Known Sites.
10	AESTHETICS (1) 2 3 4 5 Rating: 10	Visible from: Physical Disturbance	River, Highway, Air. Dust, Waste, Stockpiles, Noises.
15	RESOURCE UTILIZATION 1 2 3 4 (5) Rating: 75	Fort Good Hope Arctic Red R. Inuvik	Improved Access, Traplines, Hunting, Fishing, Domestic, Commercial.
15	ASSOCIATED DISTURBANCES 1 2 3 4 (5) Rating: 75	Access Roads Miles From Highway Miles From Pipeline Hydrologic Alterations Continued Use For Maintenance.	0-2, 2-5, 5-10, 10+ 0-2, 2-5, 5-10, 10+ Cuts and Fills, Creek Crossings, Compaction, Slumping, Erosion. Stockpiles, Waste, Dust.
10	RESTORATION 1 2 (3) 4 5 Rating: 30	Soil Stabilization Visual Improvement Habitat Replacement	Natural Regeneration, Grass-Legume Seeding, Transplants, Sustained Maintenance, Erosion Control Systems.

R.I.R. - Relative Importance Units - Base of 100 units.

NOTE: SENSITIVITY INDEX RANGE

MINIMAL SENSITIVITY		MAXIMUM SENSITIVITY
100	TO	500

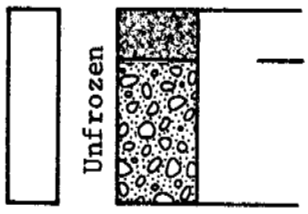
TOTAL INDEX: 350

SPECIAL CONCERNS: On south-west shore of Sandy Lake. Area utilized by Whistling Swans during spring staging and by non breeders during moulting. Winter operations, siltation control, and shoreline buffer zones recommended.

F.F. SLANEY & COMPANY LIMITED
VANCOUVER, B. C.

TEST PIT LOG

TP 1125-1

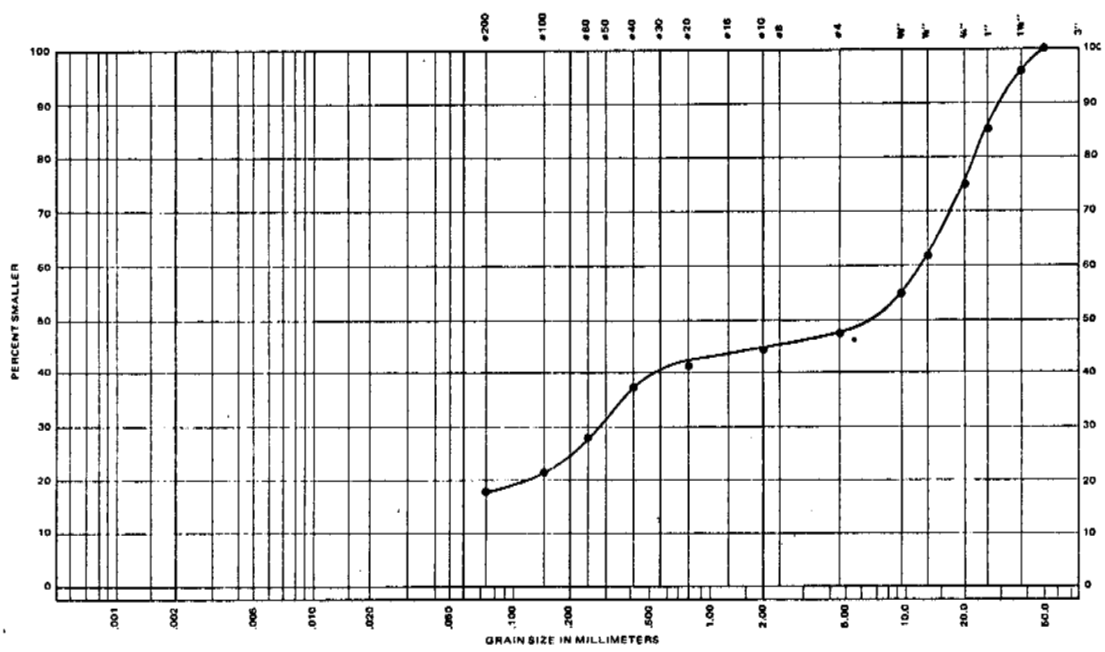


Moss

Gravel, silty
dry
very dense

53% GRAVEL
29% SAND
18% SILT AND CLAY

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



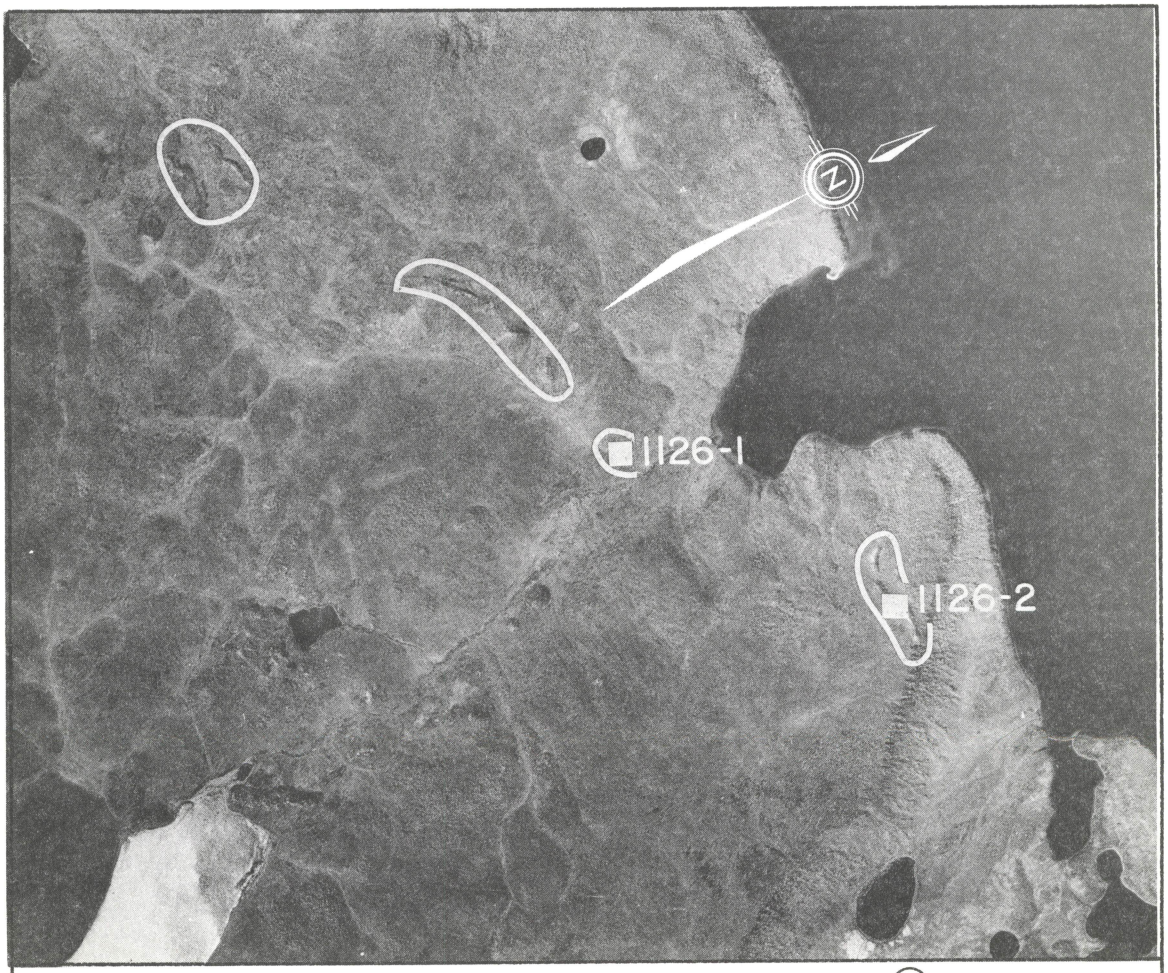
EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Gravel and Sand and Some Silt (GM) M/C = 5.14%

PROJECT Granular Resources
JOB No. E-666 DATE
SAMPLE No. TP 1125-1
DEPTH 2'

SITE 1126a

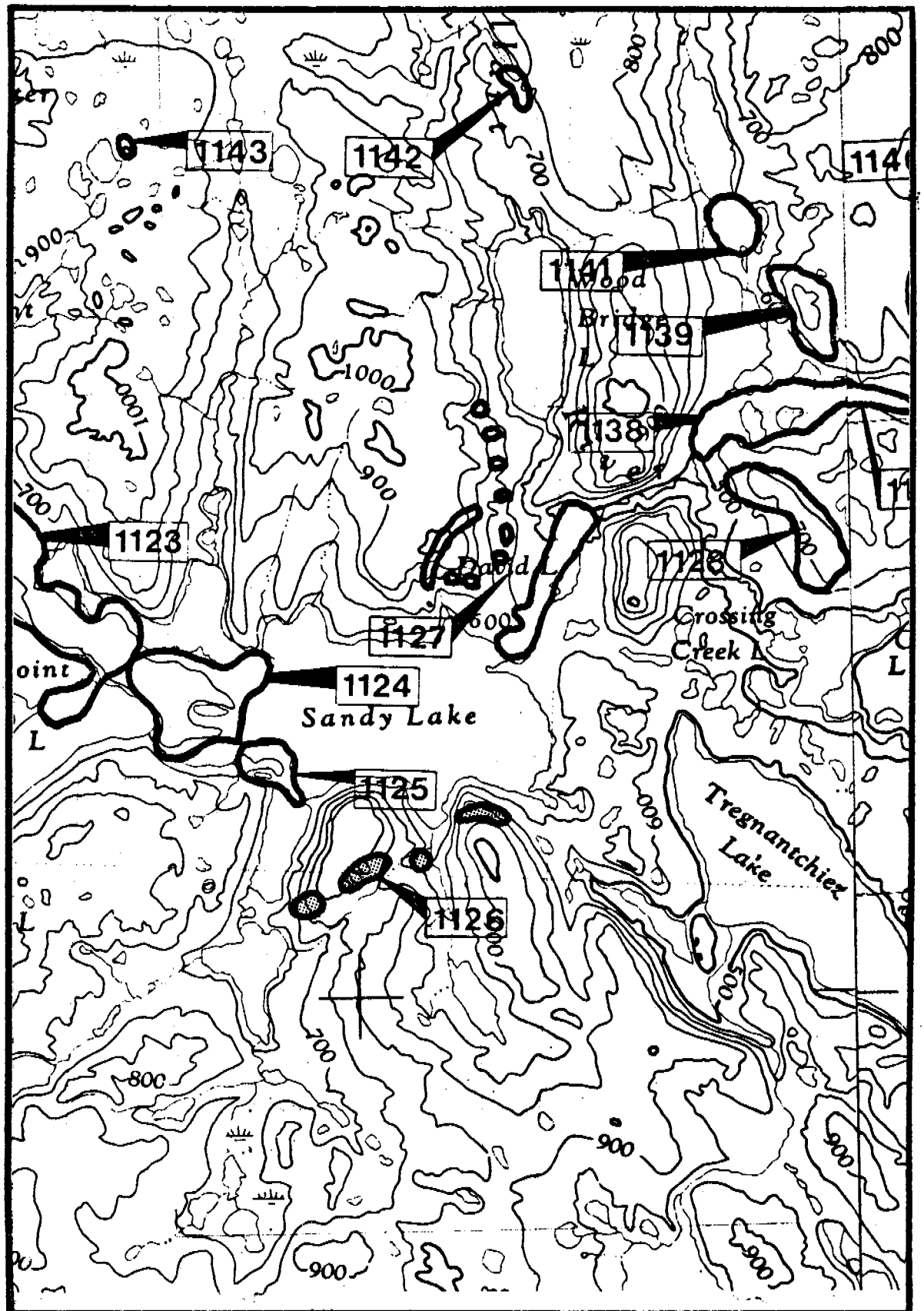
Location:	Site 1126 is situated along the south shore of Sandy Lake. The proposed highway route is 13 miles SW of the site.
Geology:	The material at site 1126 is contained in a few small scattered eskers.
Material:	Sand and gravel, trace silt, well graded.
Area:	20 acres.
Drainage:	The site is well drained.



□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A23016-92 SCALE: 1" = 5500' (approx.)

Assessment: The small eskers at site 1126 contain a small volume of good quality material. Overburden is thin to negligible but dense brush cover will have to be removed. Access crosses hilly and thermally sensitive terrain and haulage distance to proposed construction sites is very long. In view of the long haulage distance, low volume return from this scattered deposit, and large nearby deposits site 1126 is not recommended for development.



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: TRAVAILLANT LAKE 106-O
ARTIC RED RIVER 106-N

SCALE: 1:125,000

SITE 1126

ENVIRONMENTAL SENSITIVITY INDEX

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	TERRAIN 1 (2) 3 4 5 Rating: 10	Formation Stability Ice Content	Flat Land, Terrace, Knoll, Rolling, Outcrop, Ridge, Scarp, Overburden Type & Depth, Wet Site, Dry Site.
5	VEGETATION 1 (2) 3 4 5 Rating: 10	Aesthetic Value Habitat Value	Marsh Black Spruce Muskeg White Spruce Mixed Conifer Conifer - Deciduous Deciduous Dry Slopes Riparian
15	MAMMALS 1 2 (3) 4 5 Rating: 45	Ungulates Furbearers Carnivores Small Mammals	Winter Range, Summer Range, Migration Route, Denning Area, Dams and Lodges, Special Habitat Use.
10	BIRDS 1 2 (3) 4 5 Rating: 30	Waterfowl-Swans, Geese, Ducks Game Birds Raptors Shorebirds Passerine	Migration Pathway, Moulting, Spring Staging, Fall Staging, Nesting-Brooding, Perching, Winter Habitat.
10	FISHERY 1 2 3 (4) 5 Rating: 40	Lakes, Tributaries Mackenzie River: Whitefish / Smelt Grayling / Sculpin Pike / Goldeye Trout-Perch / Chub Lake Trout / Dace Burbot / Walleye Suckers / Char Stickleback / Cisco	Spawning, Nursery, Feeding, Overwintering. Major Migration Route. Siltation of Spawning Areas, Benthic Communities. Toxic Material Spill. Slumps, Velocity Increments, Migration Barriers. Eutrophication. Blasting.

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	ARCHAEOLOGY 1 2 (3) 4 5 Rating: 15	Paleontology Pre-Historic Historic	Probability of Discovery. Low, Medium, High. Known Sites.
10	AESTHETICS (1) 2 3 4 5 Rating: 10	Visible from: Physical Disturbance	River, Highway, Air. Dust, Waste, Stockpiles, Noises.
15	RESOURCE UTILIZATION 1 2 3 (4) 5 Rating: 60	Fort Good Hope Arctic Red R. Inuvik	Improved Access. Traplines. Hunting. Fishing. Domestic. Commercial.
15	ASSOCIATED DISTURBANCES 1 2 3 4 (5) Rating: 75	Access Roads Miles From Highway Miles From Pipeline Hydrologic Alterations Continued Use For Maintenance.	0-2, 2-5, 5-10, 10+ 0-2, 2-5, 5-10, 10+ Cuts and Fills. Creek Crossings. Compaction, Slumping, Erosion. Stockpiles, Waste, Dust.
10	RESTORATION 1 2 (3) 4 5 Rating: 30	Soil Stabilization Visual Improvement Habitat Replacement	Natural Regeneration. Grass-Legume Seeding. Transplants. Sustained Maintenance. Erosion Control Systems.

R.I.R. - Relative Importance Units - Base of 100 units.

NOTE: SENSITIVITY INDEX RANGE

MINIMAL SENSITIVITY		MAXIMUM SENSITIVITY
100	TO	500

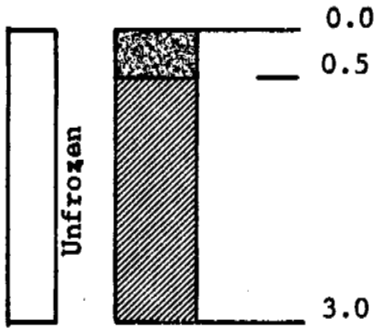
TOTAL INDEX: 325

SPECIAL CONCERNS: On south-east shore of Sandy Lake. Area utilized by Whistling Swan during spring staging (May 10-June 20) and by non breeders during moult. Recommend maintenance of shoreline values through winter operations, siltation controls and buffer zones.

F.F. SLANEY & COMPANY LIMITED
VANCOUVER, B. C.

TEST PIT LOG

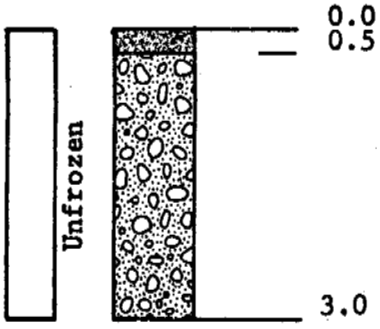
TP 1126-1



Peat

Silty Clay, moist
medium plasticity
light grey

TP 1126-2

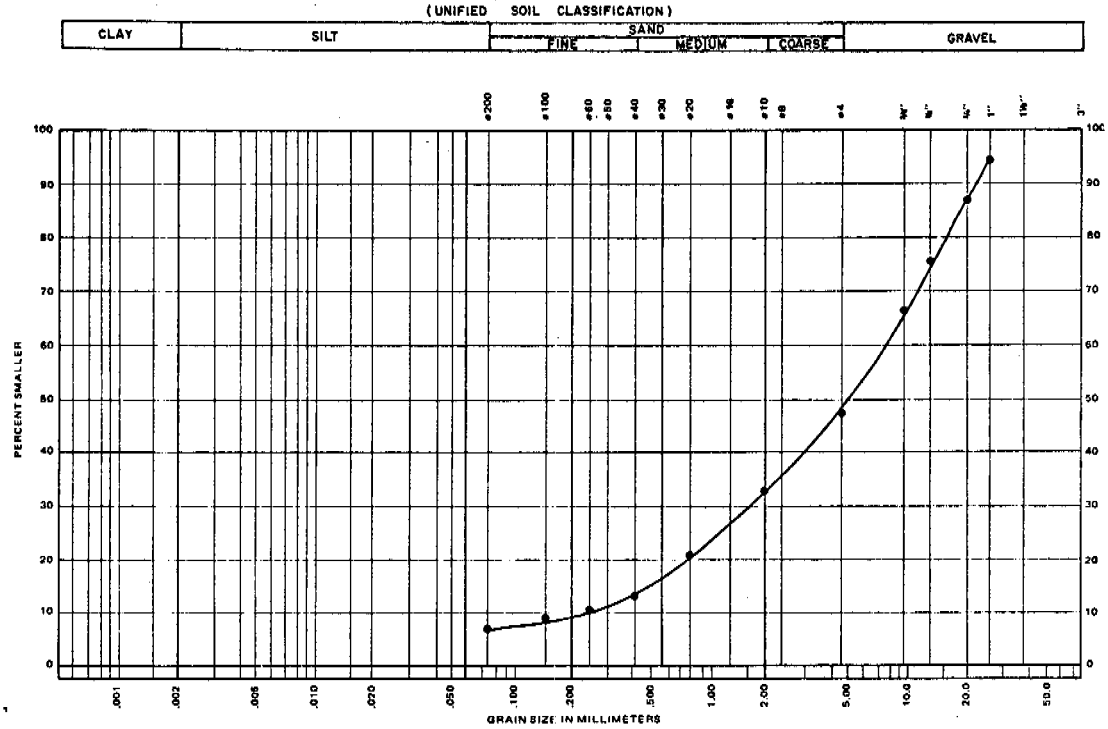


Moss

Gravel, brown
moist
well graded

52% GRAVEL
40% SAND
8% SILT & CLAY

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



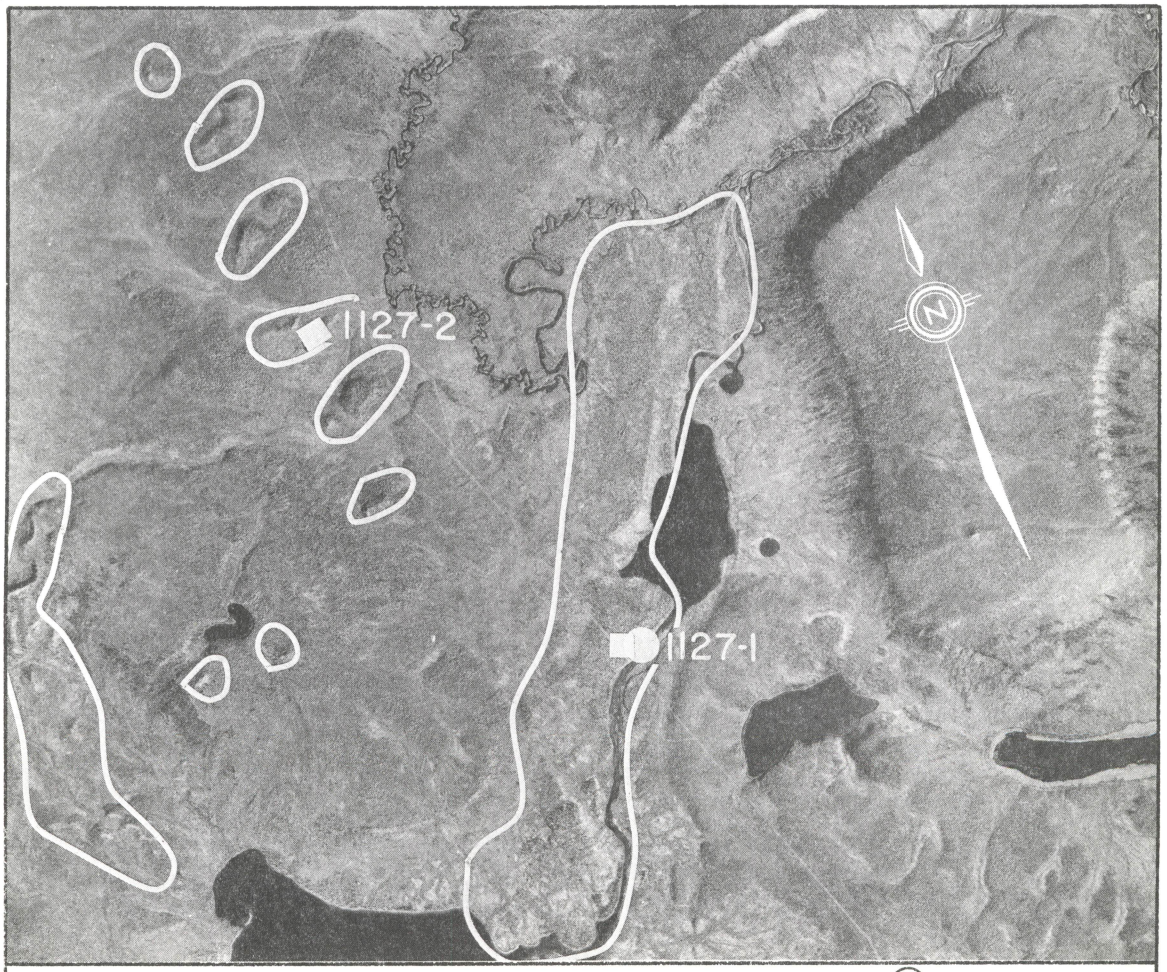
EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION: Sand and Gravel with a Trace of Silt (GW GM) M/C = 4.27%

PROJECT: Granular Resources
JOB No.: E-666 DATE: Nov. 29/73
SAMPLE No.: TP 1126-2
DEPTH: 3'

SITE 1127

Location:	Site 1127 is 2.5 miles north-west of Tregnantchiez Lake. Proposed highway and pipeline routes are 18 miles south of the site.
Geology:	The material at site 1127 is contained in a complex of outwash, kames and eskers. Considerable variation in the material contained in the kames and eskers is anticipated.
Material:	Silty gravel and sand, well graded.
Volume:	5,700,000 cu. yd., estimate seems reliable.
Area:	400 acres.

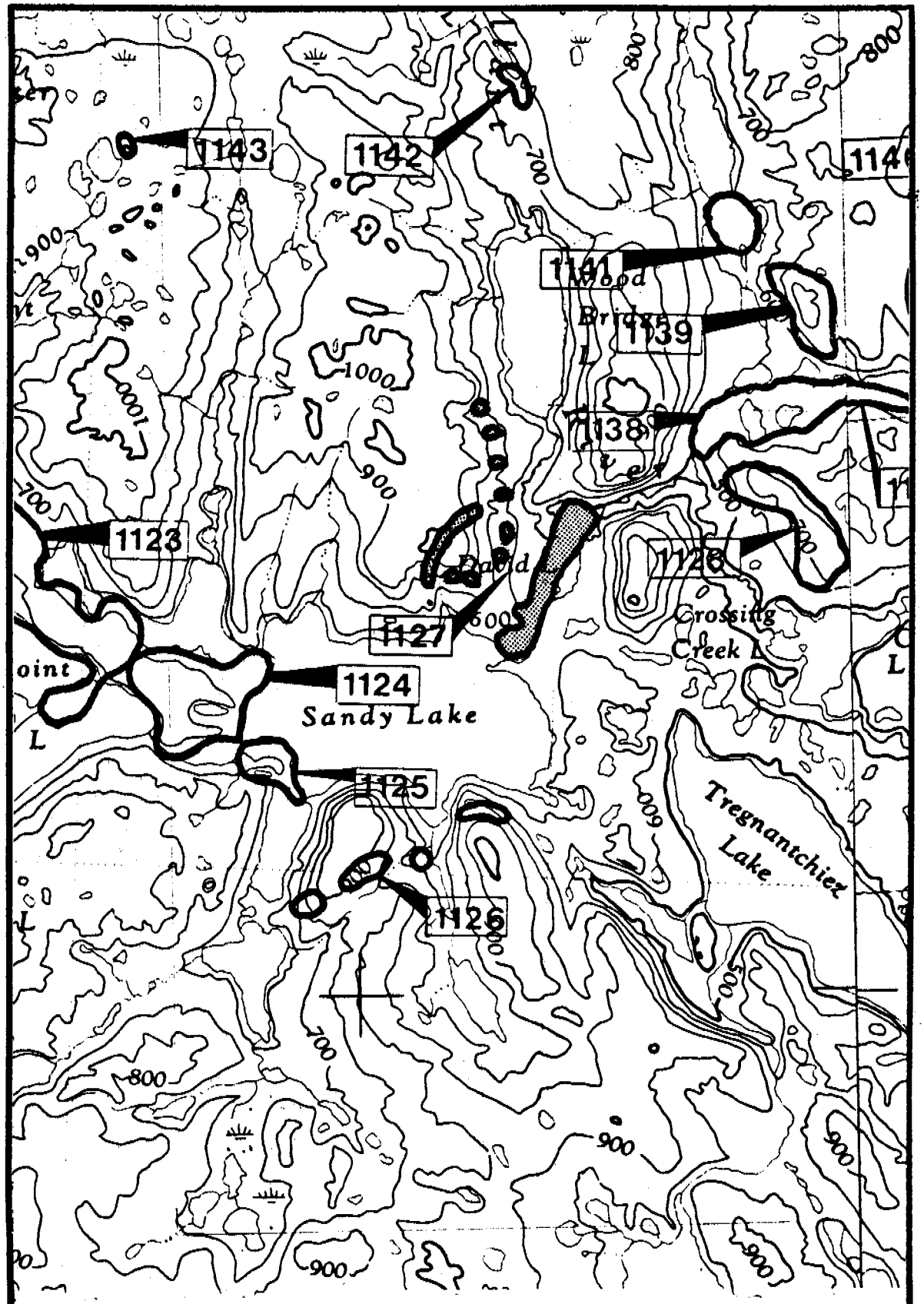


□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A23016-35 SCALE: 1" = 3000' (approx.)

Drainage: The site is well drained.

Assessment: A large volume of good quality borrow was encountered at site 1127 during the exploration program. The material in the outwash towards the east of the site is expected to be quite uniform and was found to be unfrozen for at least 21 ft. Overburden is negligible and tree cover sparse. Access is expected to be difficult because of hilly and thermally sensitive terrain. Haulage distance to proposed construction sites is very long. The site has a high environmental sensitivity rating. Moisture contents of the material are low. Because of the long haulage distance it is doubtful whether it is feasible to develop the site.



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: TRAVAILLANT LAKE 106-O
ARTIC RED RIVER 106-N

SCALE: 1:125,000

SITE 1127

ENVIRONMENTAL SENSITIVITY INDEX

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	TERRAIN 1 2 (3) 4 5 Rating: 15	Formation Stability Ice Content	Flat Land, Terrace, Knoll, Rolling, Outcrop, Ridge, Scarp, Overburden Type & Depth, Wet Site, Dry Site.
5	VEGETATION 1 (2) 3 4 5 Rating: 10	Aesthetic Value Habitat Value	Marsh Black Spruce Muskeg White Spruce Mixed Conifer Conifer - Deciduous Deciduous Dry Slopes Riparian
15	MAMMALS 1 2 3 (4) 5 Rating: 60	Ungulates Furbearers Carnivores Small Mammals	Winter Range, Summer Range, Migration Route, Denning Area, Dams and Lodges, Special Habitat Use.
10	BIRDS 1 2 3 (4) 5 Rating: 40	Waterfowl-Swans, Geese, Ducks Game Birds Raptors Shorebirds Passerine	Migration Pathway, Moulting, Spring Staging, Fall Staging, Nesting-Brooding, Perching, Winter Habitat.
10	FISHERY 1 2 3 (4) 5 Rating: 40	Lakes, Tributaries Mackenzie River: Whitefish, Smelt Grayling, Sculpin Pike, Goldeye Trout-Perch, Chub Lake Trout, Dace Burbot, Walleye Suckers, Char Stickleback, Cisco	Spawning, Nursery, Feeding, Overwintering. Major Migration Route. Siltation of Spawning Areas, Benthic Communities. Toxic Material Spill. Slumps, Velocity Increments, Migration Barriers. Eutrophication. Blasting.

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	ARCHAEOLOGY 1 2 (3) 4 5 Rating: 15	Paleontology Pre-Historic Historic	Probability of Discovery. Low, Medium, High. Known Sites.
10	AESTHETICS 1 (2) 3 4 5 Rating: 20	Visible from: Physical Disturbance	River, Highway, Air. Dust, Waste, Stockpiles, Noises.
15	RESOURCE UTILIZATION 1 2 3 (4) 5 Rating: 60	Fort Good Hope Arctic Red R. Inuvik	Improved Access. Traplines, Hunting, Fishing. Domestic. Commercial.
15	ASSOCIATED DISTURBANCES 1 2 3 4 (5) Rating: 75	Access Roads Miles From Highway Miles From Pipeline Hydrologic Alterations Continued Use For Maintenance.	0-2, 2-5, 5-10, 10+ 0-2, 2-5, 5-10, 10+ Cuts and Fills, Creek Crossings, Compaction, Slumping, Erosion. Stockpiles, Waste, Dust.
10	RESTORATION 1 2 (3) 4 5 Rating: 30	Soil Stabilization Visual Improvement Habitat Replacement	Natural Regeneration. Grass-Legume Seeding, Transplants. Sustained Maintenance. Erosion Control Systems.

R.I.R. - Relative Importance Units - Base of 100 units.

NOTE: SENSITIVITY INDEX RANGE

MINIMAL SENSITIVITY		MAXIMUM SENSITIVITY
100	TO	500

TOTAL INDEX: 365

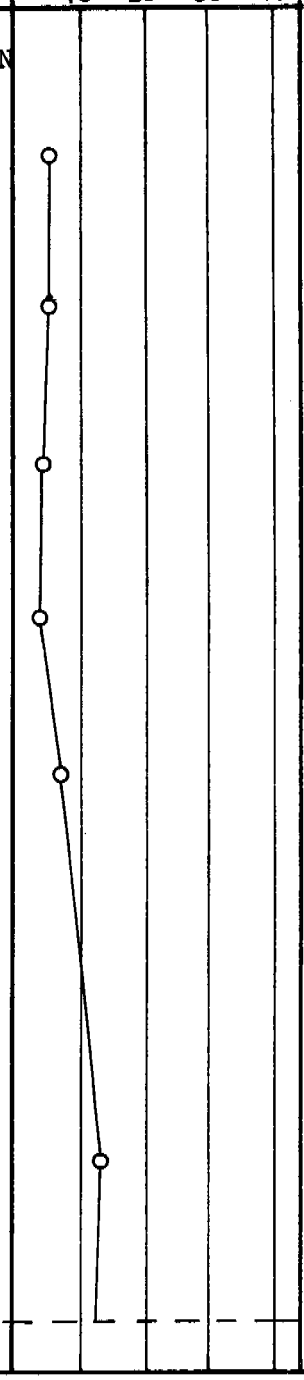
SPECIAL CONCERNS: Straddles tributary lake system, north-east of Sandy Lake. Within winter range for Barren-Ground Caribou. Denning and aquatic values important. Recommend buffer zones, siltation control and winter operations.

F.F. SLANEY & COMPANY LIMITED
VANCOUVER, B. C.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1127 HOLE NO. 1 PAGE 1 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION
1	GM	GRAVEL -sandy, silty, orange-brown	NOT FROZEN
2, 3	GW-GM	GRAVEL -very sandy, trace of silt, well graded, maximum 2", average ½", round to subangular, calcareous coatings, light brown.	
4, 5, 6, 7, 8, 9	GM	GRAVEL -silty, some sand, gravel fine to medium, very dry, light brown.	
10, 11	GM	SAND & GRAVEL some sand, damp, light brown -wet starting at 11.0'	
12, 13, 14, 15, 16, 17	SM	-gravelly, sandy, trace clay gravel is fine, sand is fine to coarse, wet, brown. (10'-20') 28% GRAVEL 48% SAND 24% SILT & CLAY	



DATE DRILLED: Sep. 21/73 | LOGGED BY: EBA 110-11 | COMPLETION DEPTH: 22.5'

DRILLING METHOD: Auger | THAW DEPTH: N/A

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY - STAGE III

SITE NO. 1127 HOLE NO. 1 PAGE 2 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
18	SM	SAND & GRAVEL -same			18
19					19
20					20
21					21
22					22
23		END OF HOLE			23
24					24
25					25
26					26
27					27
28					28
29					29
30					30
31					31
32					32
33					33
34					34

DATE DRILLED: Sept.21/73 LOGGED BY: EBA 110-11 COMPLETION DEPTH: 22.5'

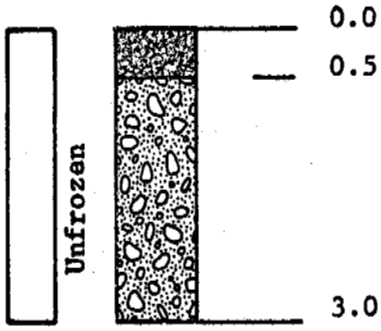
DRILLING METHOD: AUGER THAW DEPTH: N/A

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

TEST PIT LOG

TP 1127-1

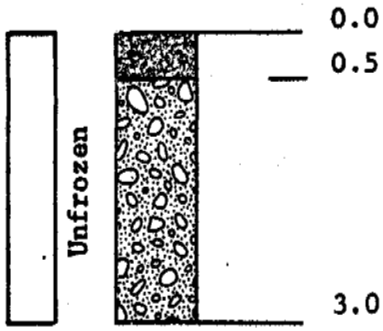


Moss

Gravel, light brown
dry
well graded

46% GRAVEL
42% SAND
12% SILT & CLAY

TP 1127-2

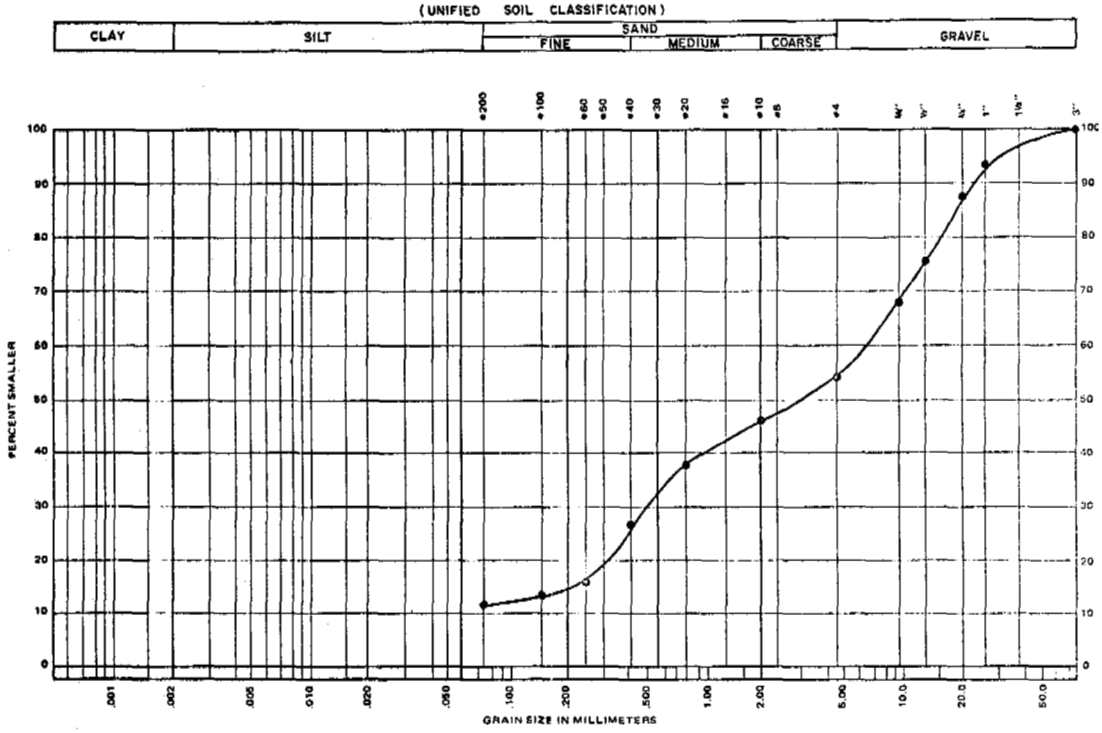


Moss

Gravel, very silty
occassional large cobbles
dry

42% GRAVEL
30% SAND
38% SILT & CLAY

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

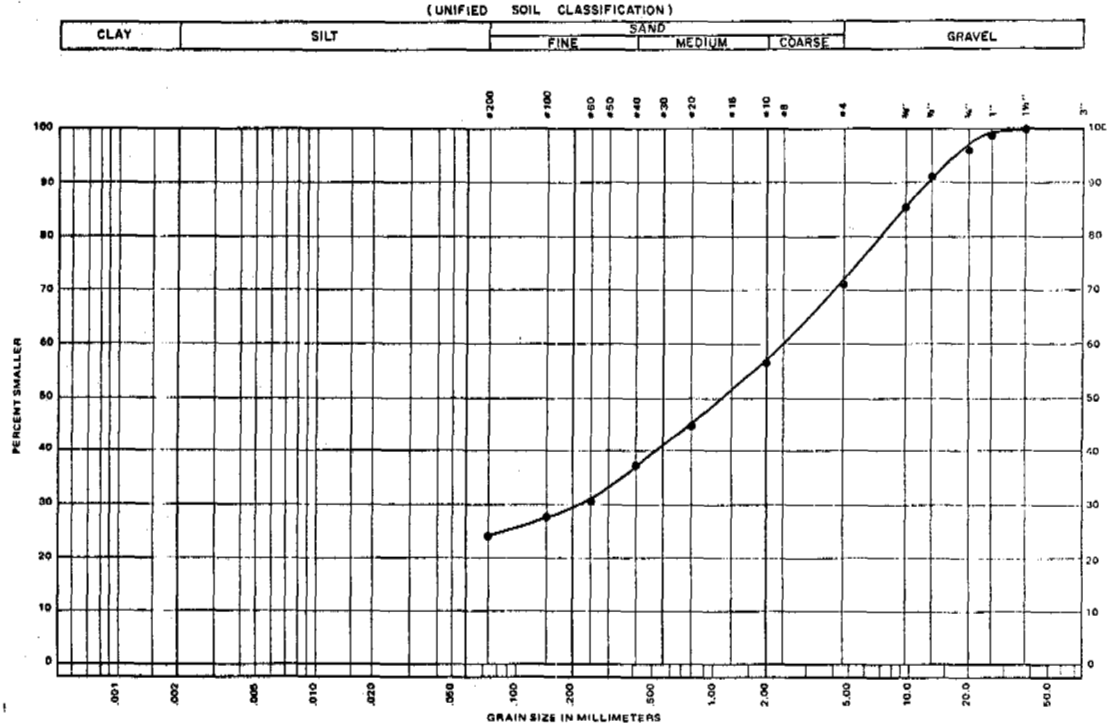


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Sand and Gravel and Some Silt (GP-GM) M/C = 4.7%

PROJECT Granular Resources
JOB No. E-666 DATE Oct. 17/73
SAMPLE No. TP 1127-1
DEPTH 3'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

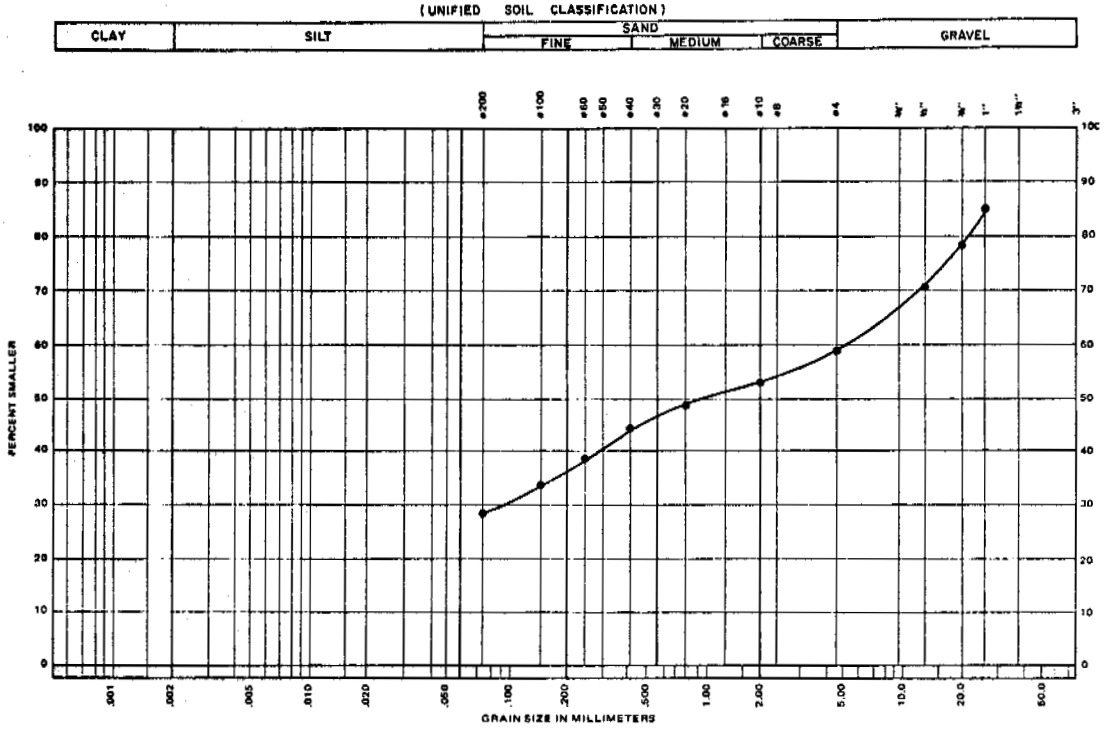


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Gravelly Silty Sand (SM)

PROJECT Granular Resources
JOB No. E-666 DATE Oct. 10/73
SAMPLE No. BH 1127-1
DEPTH 10' - 20'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Gravel and Sand
Silty (GM) M/C = 9.9%

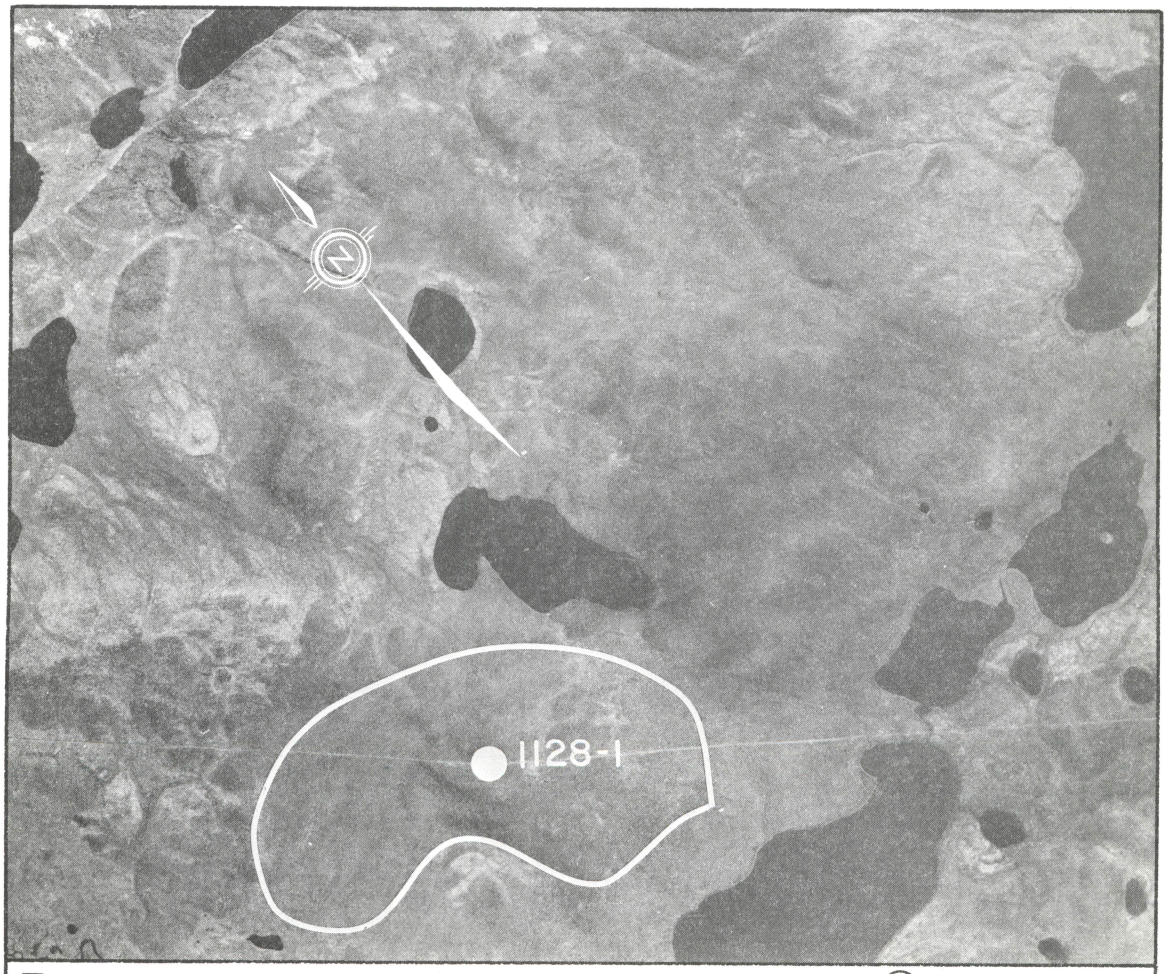
PROJECT Granular Resources
JOB No. E-666 DATE
SAMPLE No. TP 1127-2
DEPTH 3'

SITE 1128

Location: Site 1128 is situated 1.5 miles north of Crossing Creek Lake. The proposed highway and pipeline routes are 20 miles south of the site.

Material: Shale.

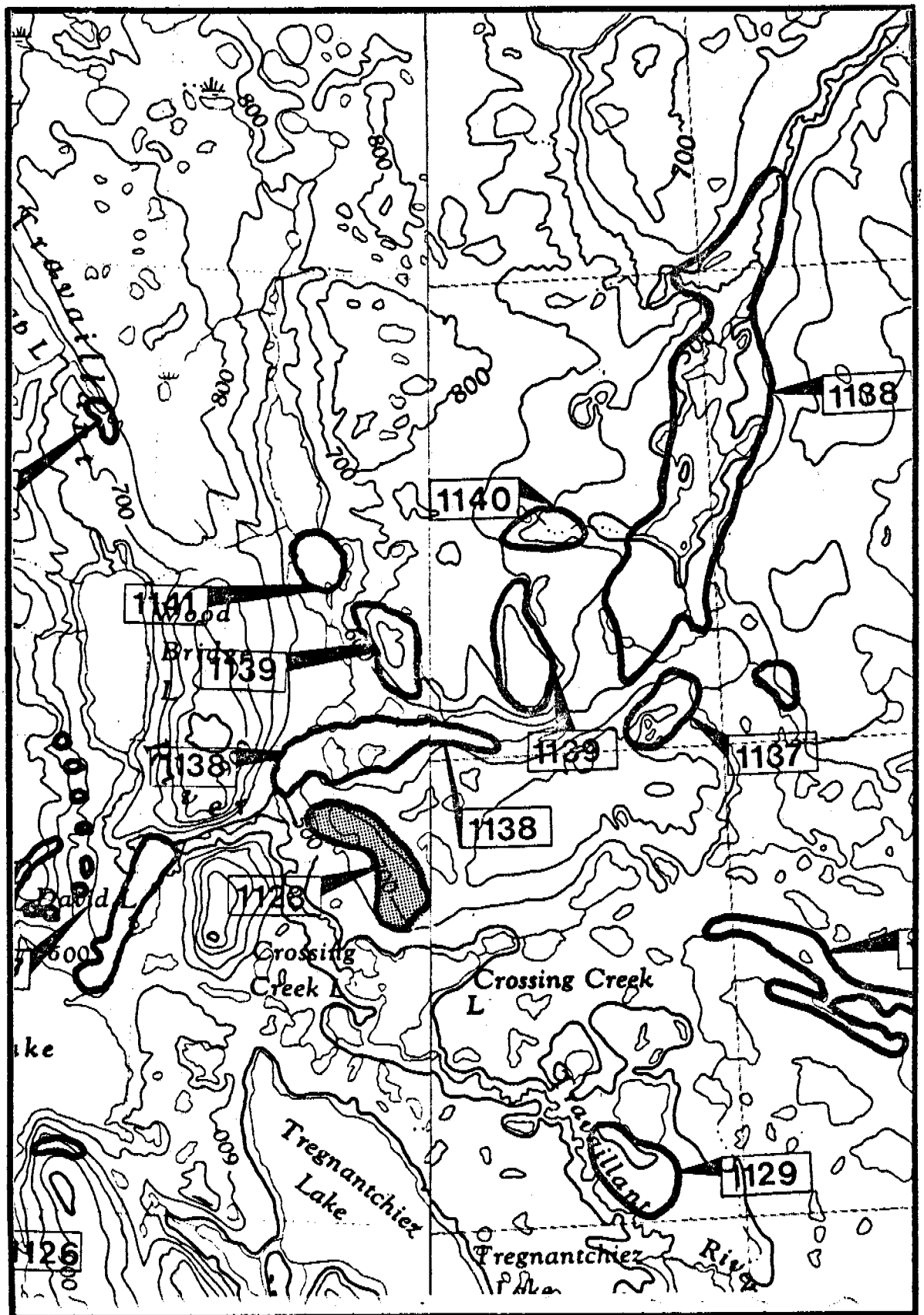
Assessment: Twelve feet of clayey silt overburden overlies firm shale at site 1128. The shale would be suitable as fair quality borrow material. A relatively large volume of material is available from the site. Permafrost was encountered just below the surface of the ground. Access to the site is difficult because of hilly and thermally sensitive terrain. Haulage distance to proposed



□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A22935-202 SCALE: 1" = 3000' (approx.)

construction sites is very long. Unless material shortages are critical or construction sites are located nearer to the site it is unlikely that site 1128 can be considered for development.



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: TRAVAILLANT LAKE 106-O
ARTIC RED RIVER 106-N

SCALE: 1:125,000

SITE 1128

ENVIRONMENTAL SENSITIVITY INDEX

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	TERRAIN (1) 2 3 4 5 Rating: 5	Formation Stability Ice Content	Flat Land, Terrace, Knoll, Rolling, Outcrop, Ridge, Scarp, Overburden Type & Depth, Wet Site, Dry Site.
5	VEGETATION 1 (2) 3 4 5 Rating: 10	Aesthetic Value Habitat Value	Marsh Black Spruce Muskeg White Spruce Mixed Conifer Conifer - Deciduous Deciduous Dry Slopes Riparian
15	MAMMALS 1 (2) 3 4 5 Rating: 30	Ungulates Furbearers Carnivores Small Mammals	Winter Range, Summer Range, Migration Route, Denning Area, Dams and Lodges, Special Habitat Use.
10	BIRDS 1 (2) 3 4 5 Rating: 20	Waterfowl-Swans, Geese, Ducks Game Birds Raptors Shorebirds Passerine	Migration Pathway, Moulting, Spring Staging, Fall Staging, Nesting-Brooding, Perching, Winter Habitat.
10	FISHERY 1 2 3 (4) 5 Rating: 40	Lakes, Tributaries Mackenzie River: Whitefish, Smelt Grayling, Sculpin Pike, Goldeye Trout-Perch, Chub Lake Trout, Dace Burbot, Walleye Suckers, Char Stickleback, Cisco	Spawning, Nursery, Feeding, Overwintering. Major Migration Route. Siltation of Spawning Areas, Benthic Communities. Toxic Material Spill. Slumps, Velocity Increments, Migration Barriers. Eutrophication. Blasting.
5	ARCHAEOLOGY 1 2 (3) 4 5 Rating: 15	Paleontology Pre-Historic Historic	Probability of Discovery. Low, Medium, High, Known Sites.
10	AESTHETICS (1) 2 3 4 5 Rating: 10	Visible from: Physical Disturbance	River, Highway, Air. Dust, Waste, Stockpiles, Noises.
15	RESOURCE UTILIZATION 1 2 3 (4) 5 Rating: 60	Fort Good Hope Arctic Red R. Inuvik	Improved Access. Traplines. Hunting. Fishing. Domestic. Commercial.
15	ASSOCIATED DISTURBANCES 1 2 3 4 (5) Rating: 75	Access Roads Miles From Highway Miles From Pipeline Hydrologic Alterations Continued Use For Maintenance.	0-2, 2-5, 5-10, 10+ 0-2, 2-5, 5-10, 10+ Cuts and Fills. Creek Crossings. Compaction. Slumping, Erosion. Stockpiles, Waste, Dust.
10	RESTORATION 1 (2) 3 4 5 Rating: 20	Soil Stabilization Visual Improvement Habitat Replacement	Natural Regeneration. Grass-Legume Seeding. Transplants. Sustained Maintenance. Erosion Control Systems.

R.I.R. - Relative Importance Units - Base of 100 units.

NOTE: SENSITIVITY INDEX RANGE

MINIMAL SENSITIVITY		MAXIMUM SENSITIVITY
100	TO	500

TOTAL INDEX: 285

SPECIAL CONCERNS: Upland area. Siltation control may be required. Within winter range for Barren-Ground Caribou.

F.F. SLANEY & COMPANY LIMITED
VANCOUVER, B. C.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1128 HOLE NO. 1 PAGE 1 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
1	ML	SILT brown fine sandy	Vx		1
2					2
3					3
4	ML	SILT grey clayey with trace fine gravel (till)		o	4
5					5
6					6
7					7
8				o	8
9			Nbn		9
10				o	10
11					11
12					12
13	br	SHALE grey silty, firm		o	13
14					14
15					15
16					16
17					17

DATE DRILLED: Mar. 22/72 LOGGED BY: MVP 72C-116 COMPLETION DEPTH: 28'

DRILLING METHOD: Failing 200 Air THAW DEPTH: N/A

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY - STAGE III

SITE NO. 1128 HOLE NO. 1 PAGE 2 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
18					18
19	br	SHALE grey silty, firm	Nbn	⊙	19
20					20
21					21
22					22
23					23
24					24
25					25
26					26
27					27
28				○	28
29					29
30					30
31					31
32					32
33					33
34					34

DATE DRILLED: Mar. 22/72 LOGGED BY: MVP 72C-116 COMPLETION DEPTH: 28'

DRILLING METHOD: Failing 200 Air THAW DEPTH: N/A

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

SITE 1129a

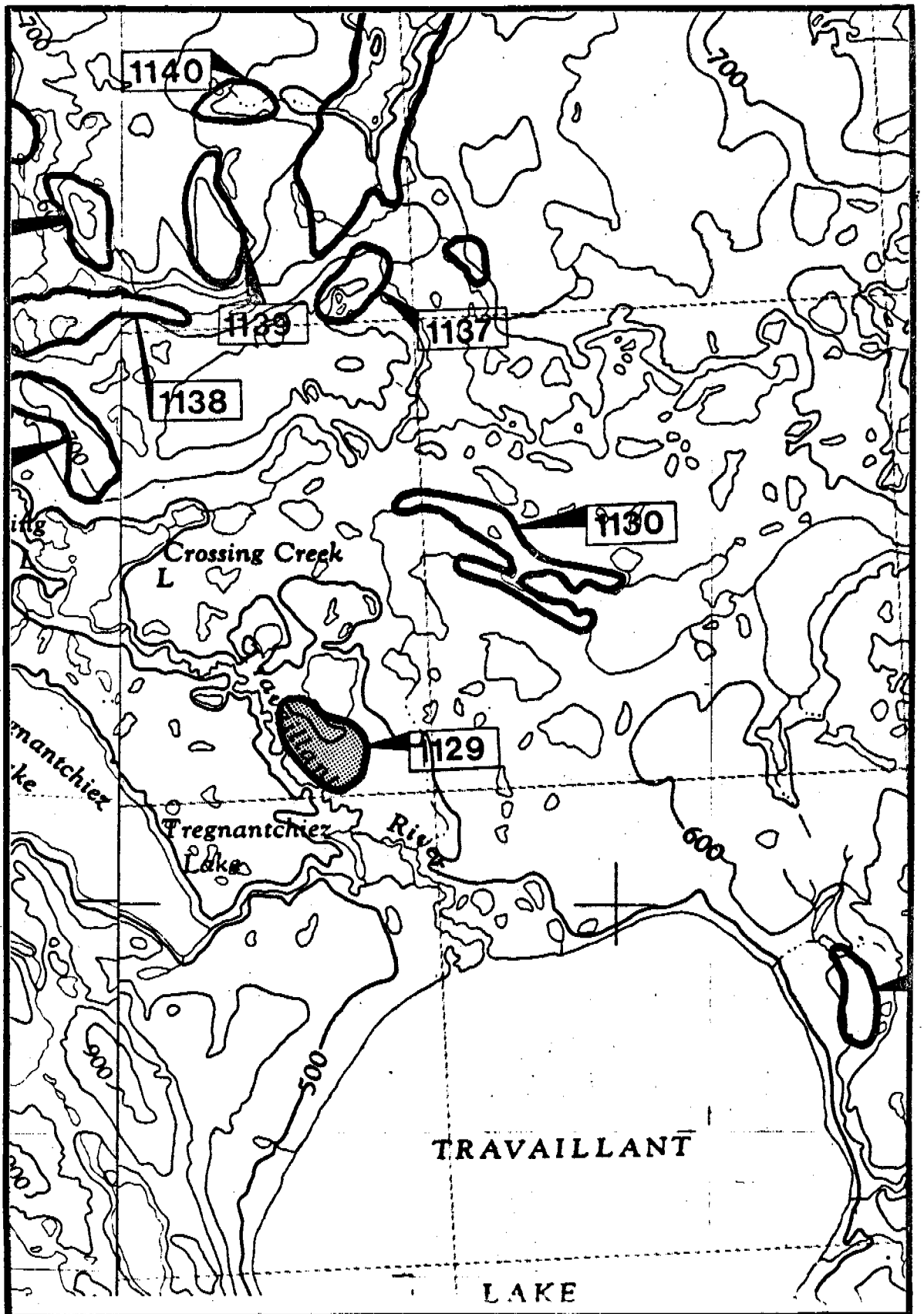
Location: Site 1129 is located 2.5 miles NNW of the point of confluence of the Travaillant River and Travaillant Lake. Proposed highway and pipeline routes are 15 miles SSW of the site.

Material: Clay.

Assessment: The material at site 1129 is unsuitable for construction purposes therefore the site is not recommended for development.

☐ TEST PIT ○ BOREHOLE

AIRPHOTO No. A22935-160 SCALE: 1" = 3000' (approx.)



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: TRAVAILLANT LAKE 106-O
ARTIC RED RIVER 106-N

SCALE: 1:125,000

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1129 HOLE NO. 1 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
1	Pt	PEAT -fibrous, medium to dark brown	NOT FROZEN		1
2		-very organic silty, low plasticity, black			2
3	CL	CLAY -silty, trace of fine sand medium plastic, grey	FROZEN		3
4					4
5					5
6		-decrease of silt, some silt			6
7					7
8					8
9					9
10					10
11					11
12					12
13		END OF HOLE			13
14					14
15					15
16					16
17					17

DATE DRILLED: Sep. 14/73

LOGGED BY: EBA 123-1

COMPLETION DEPTH: 12.0'

DRILLING METHOD: AUGER

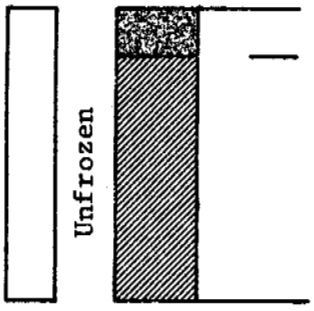
THAW DEPTH: 2.9'

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

TEST PIT LOG

TP 1129-1



0.0

0.5 Peat, black, fibrous

Clay, grey
silty
medium plasticity

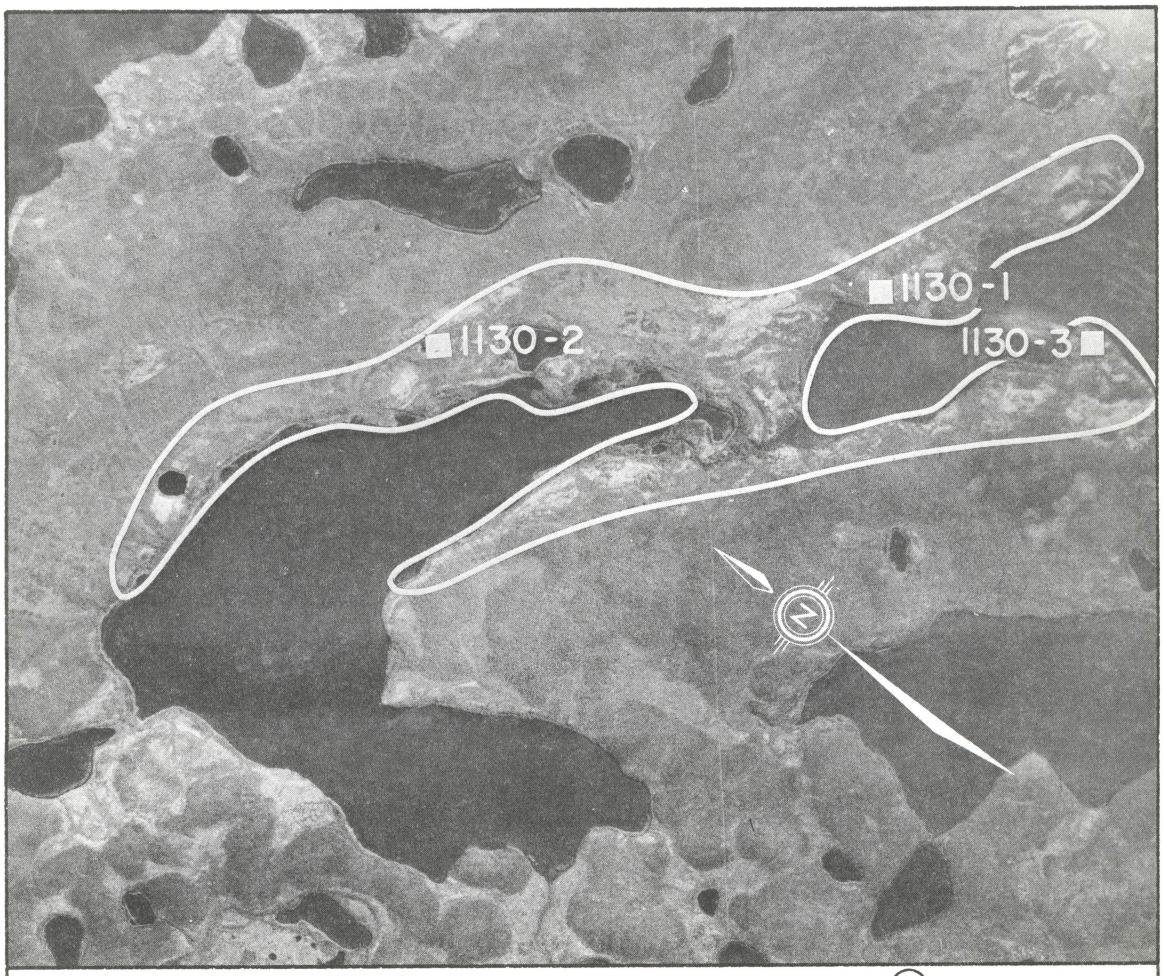
3.0

SITE 1130a

Location: Site 1130 is located 5 miles north of Travaillant Lake. Proposed pipeline and highway routes are 18 miles SW of the site.

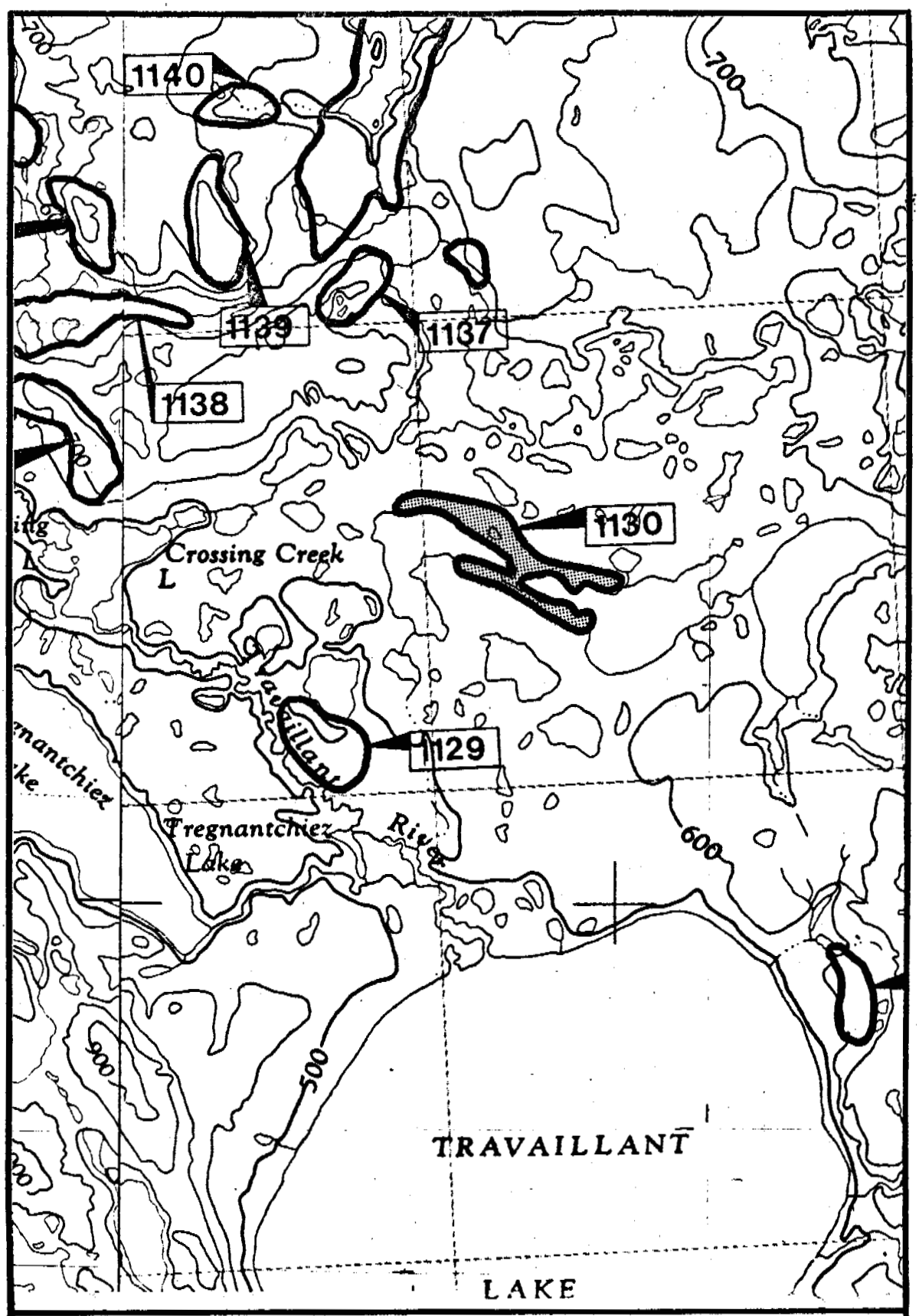
Material: Clay.

Assessment: The material at site 1130 is unsuitable for use in construction. The site is not recommended for development.



□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A22935-204 SCALE: 1" = 3000' (approx.)



SITE LIMITS

PROPOSED GAS PIPELINE

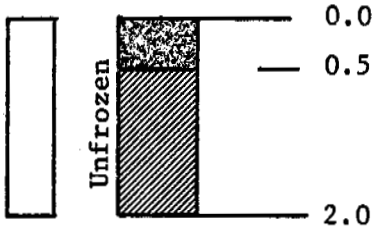
PROPOSED MACKENZIE HIGHWAY

MAPS: TRAVAILLANT LAKE 106-O
ARTIC RED RIVER 106-N

SCALE: 1:125,000

TEST PIT LOG

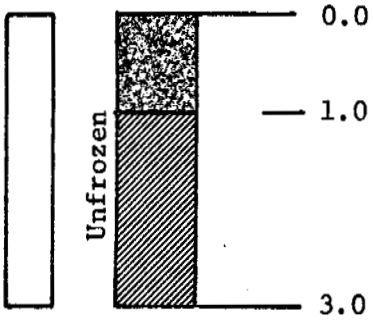
TP 1130-1



Peat, black fibrous

Clay, grey, silty, wet

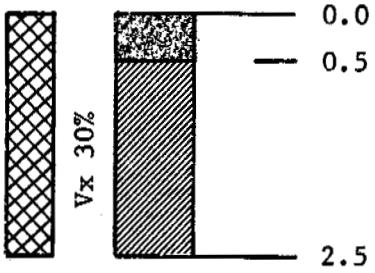
TP 1130-2



Moss

Silty Clay, grey
moist

TP 1130-3

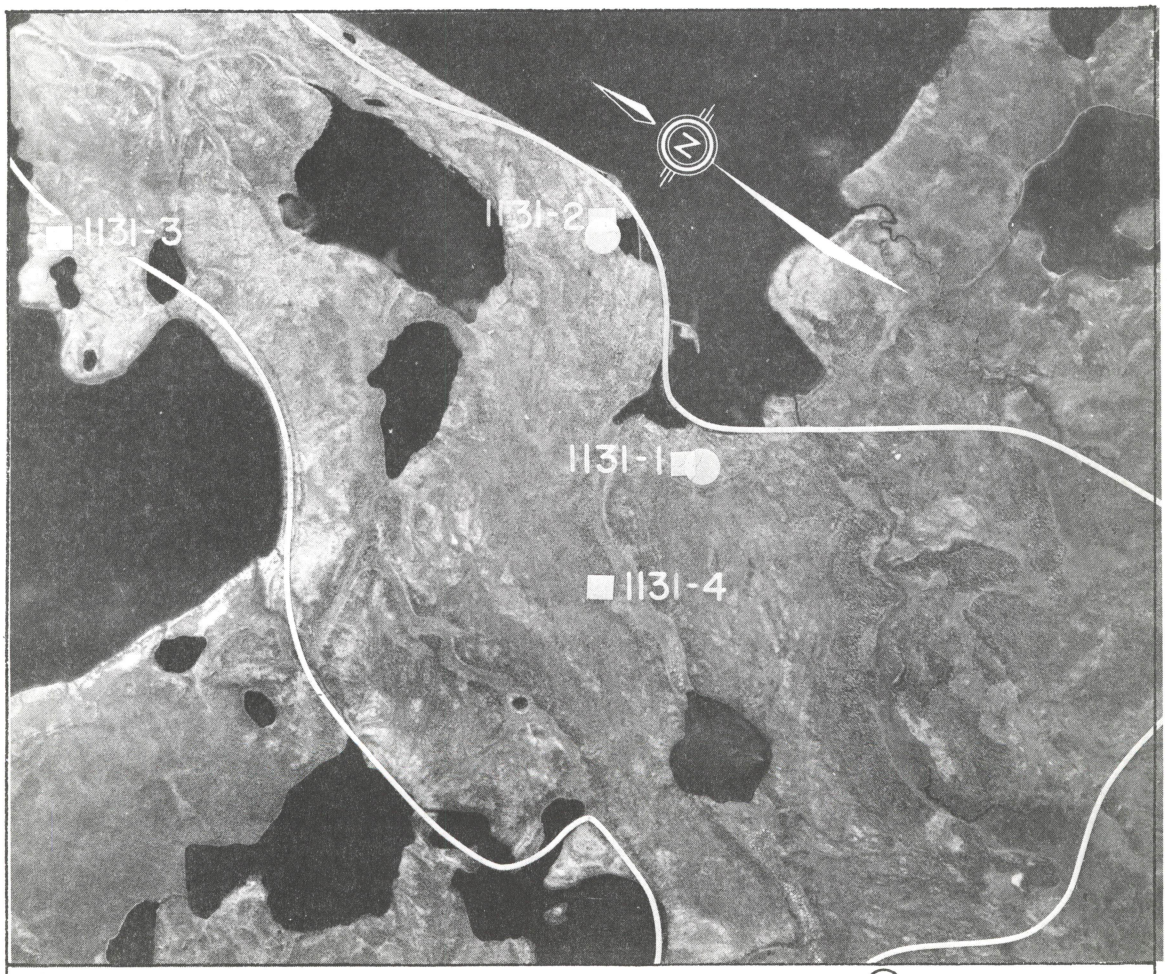


Moss

Clay, medium plasticity
moist

SITE 1131a

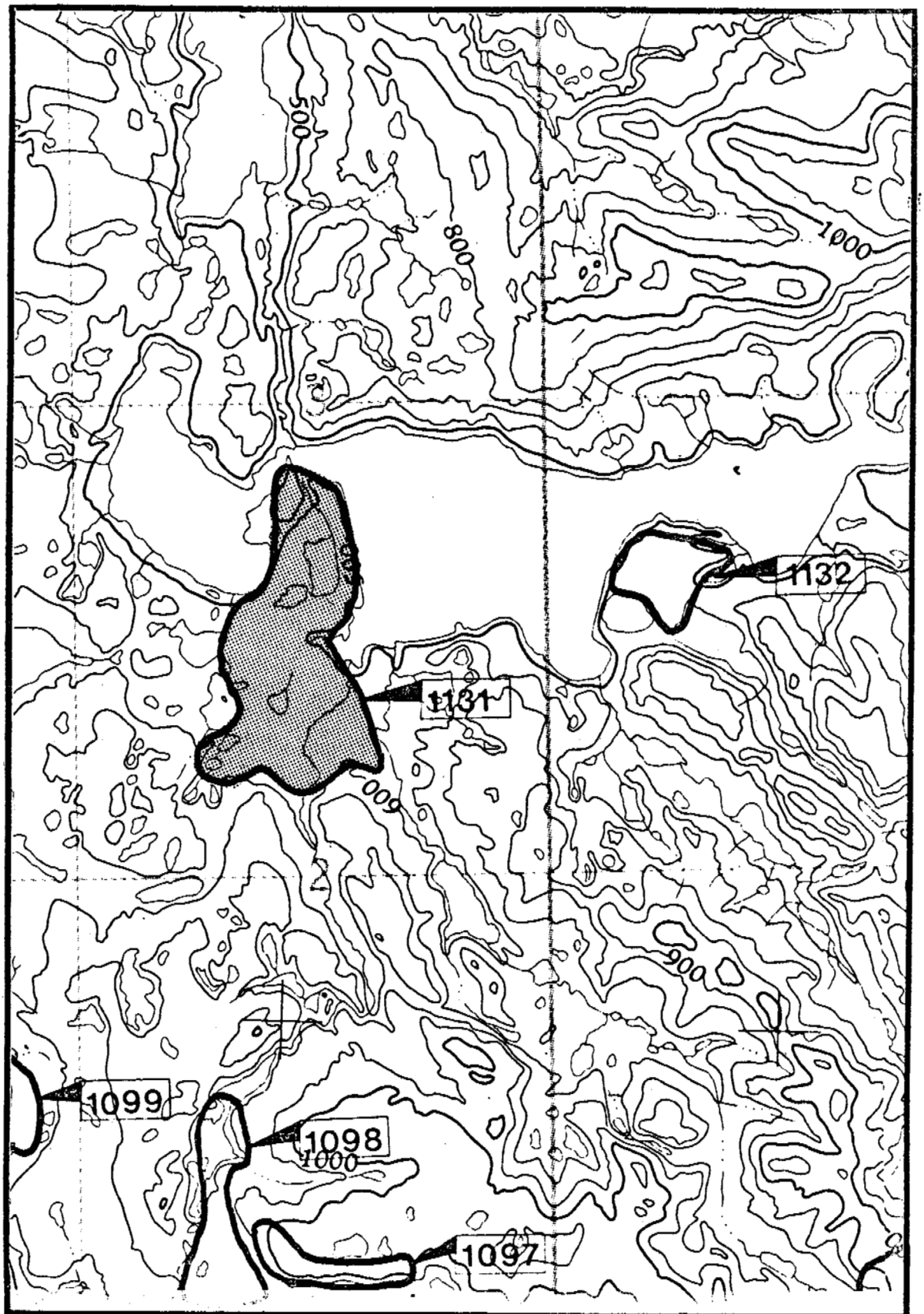
Location:	Site 1131 is situated approximately 9 miles NE of Travaillant Lake. The proposed highway route is 15 miles south of the site.
Geology:	Site 1131 is a large deltaic feature composed of glacial till.
Material:	Variable from gravel and sand with some silt to sand and silt with a trace of gravel, generally well graded, glacial till.
Volume:	10,000,000 cu. yd., reliability of estimate is uncertain.
Area:	2200 acres.



□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A22935-37 SCALE: 1" = 3000' (approx.)

Assessment: Data on this large area is limited, however that which is available, indicates the material to be of poor quality, generally unsuitable for engineering purposes. Moisture contents of the materials are high. Haulage distance to proposed highway and pipeline routes is very long and access is difficult because of hilly and thermally sensitive terrain. The lack of suitable material for use in construction makes development of site 1131 unfeasible.



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: TRAVAILLANT LAKE 106-O

SCALE: 1:125,000

SITE 1131

ENVIRONMENTAL SENSITIVITY INDEX

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	TERRAIN 1 2 (3) 4 5 Rating: 15	Formation Stability Ice Content	Flat Land, Terrace, Knoll, Rolling, Outcrop, Ridge, Scarp, Overburden Type & Depth, Wet Site, Dry Site.
5	VEGETATION 1 (2) 3 4 5 Rating: 10	Aesthetic Value Habitat Value	Marsh Black Spruce Muskeg White Spruce Mixed Conifer Conifer - Deciduous Deciduous Dry Slopes Riparian
15	MAMMALS 1 2 3 (4) 5 Rating: 60	Ungulates Furbearers Carnivores Small Mammals	Winter Range, Summer Range, Migration Route, Denning Area, Dams and Lodges, Special Habitat Use.
10	BIRDS 1 2 3 (4) 5 Rating: 40	Waterfowl-Swans, Geese, Ducks Game Birds Raptors Shorebirds Passerine	Migration Pathway, Moulting, Spring Staging, Fall Staging, Nesting-Brooding, Perching, Winter Habitat.
10	FISHERY 1 2 3 4 (5) Rating: 50	Lakes, Tributaries Mackenzie River: Whitefish Grayling Pike Trout-Perch Lake Trout Burbot Suckers Stickleback Smelt Sculpin Goldeye Chub Dace Walleye Char Cisco	Spawning, Nursery, Feeding, Overwintering. Major Migration Route. Siltation of Spawning Areas, Benthic Communities. Toxic Material Spill. Slumps, Velocity Increments, Migration Barriers. Eutrophication. Blasting.
5	ARCHAEOLOGY 1 2 3 (4) 5 Rating: 20	Paleontology Pre-Historic Historic	Probability of Discovery. Low, Medium, High. Known Sites.
10	AESTHETICS 1 (2) 3 4 5 Rating: 20	Visible from: Physical Disturbance	River, Highway, Air. Dust, Waste, Stockpiles, Noises.
15	RESOURCE UTILIZATION 1 2 3 (4) 5 Rating: 60	Fort Good Hope Arctic Red R. Inuvik	Improved Access. Traplines, Hunting, Fishing, Domestic, Commercial.
15	ASSOCIATED DISTURBANCES 1 2 3 4 (5) Rating: 75	Access Roads Miles From Highway Miles From Pipeline Hydrologic Alterations Continued Use For Maintenance.	0-2, 2-5, 5-10, 10+ 0-2, 2-5, 5-10, 10+ Cuts and Fills, Creek Crossings, Compaction, Slumping, Erosion. Stockpiles, Waste, Dust.
10	RESTORATION 1 2 (3) 4 5 Rating: 30	Soil Stabilization Visual Improvement Habitat Replacement	Natural Regeneration, Grass-Legume Seeding, Transplants, Sustained Maintenance, Erosion Control Systems.

R.I.R. - Relative Importance Units - Base of 100 units.

NOTE: SENSITIVITY INDEX RANGE

MINIMAL SENSITIVITY		MAXIMUM SENSITIVITY
100	TO	500

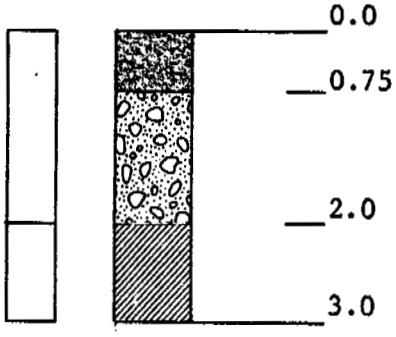
TOTAL INDEX: 380

SPECIAL CONCERNS: On dominant point in a large lake. Whistling Swans utilize the area for spring staging (May 10-June 20), and moulting. Important upland and shoreline habitats warrant consideration in development plans.

F.F. SLANEY & COMPANY LIMITED
VANCOUVER, B. C.

TEST PIT LOG

TP 1131-2



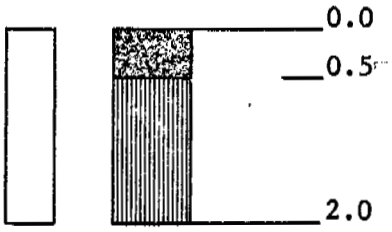
Peat, black, fibrous

Gravel, grey, clayey

Rounded particles, medium plasticity (glacial till)

52% GRAVEL
18% SAND
30% SILT & CLAY

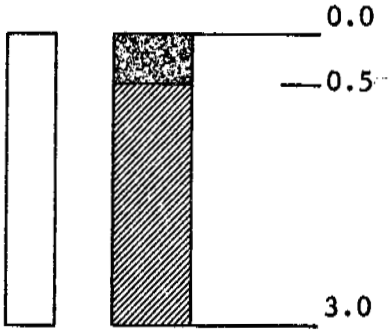
TP 1131-4



Moss

Silt, clayey, grey,moist

TP 1131-4



Moss

Clay, sandy occassional pebbles, very wet

9% GRAVEL
47% SAND
44% SILT & CLAY

GRANULAR MATERIALS INVENTORY - STAGE III

SITE NO. 1131 HOLE NO. 1 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
1	Pt	PEAT -some organic silt, fibrous dark brown.	NOT FROZEN		1
2			Vr 20%	784	2
3					3
4				230	4
5					5
6	CL	CLAY -silty, some fine sand, trace of fine gravel, brown-grey	Nbe	64	6
7					7
8					8
9			V 20%		9
10	ML	SILT -sandy, some clay, trace fine gravel, sand fine to medium-coarse grained, wet, grey-brown.			10
11					11
12					12
13		END OF HOLE			13
14		*Just off of small very low volume esker.			14
15					15
16					16
17					17

DATE DRILLED: Sep 13/73 | LOGGED BY: EBA 125-1 | COMPLETION DEPTH: 12.5'

DRILLING METHOD: AUGER | THAW DEPTH: 1.2'

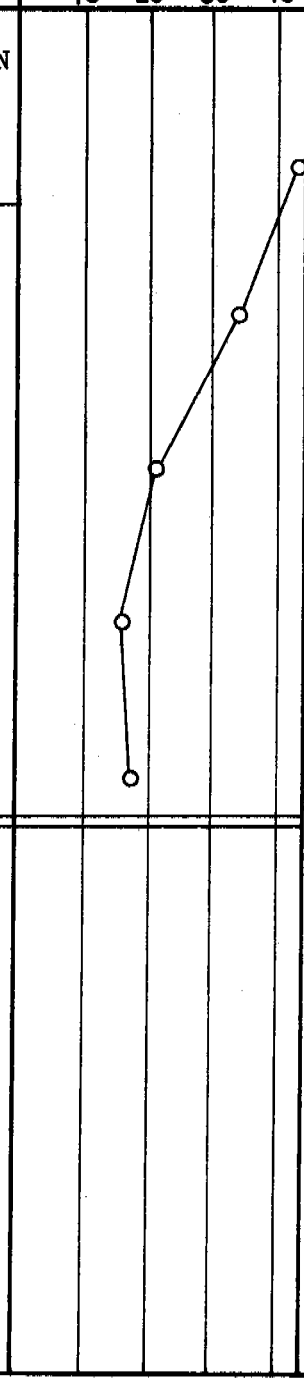
GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1131 HOLE NO. 2 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION
1	Pt	PEAT -silty, fibrous, brown	NOT FROZEN
2	CL	CLAY -silty, some gravel, maximum 1", average ½", subangular to subrounded, medium plastic, brown-grey. -sandy, silty, some gravel	FROZEN
3			
4			
5			
6		-slight increase in gravel content.	
7			
8		-gravel is very fine	
9			
10			
11		END OF HOLE	
12			
13			
14			
15			
16			
17			



DATE DRILLED: Sep. 13/73

LOGGED BY: EBA 125-2

COMPLETION DEPTH: 10.5'

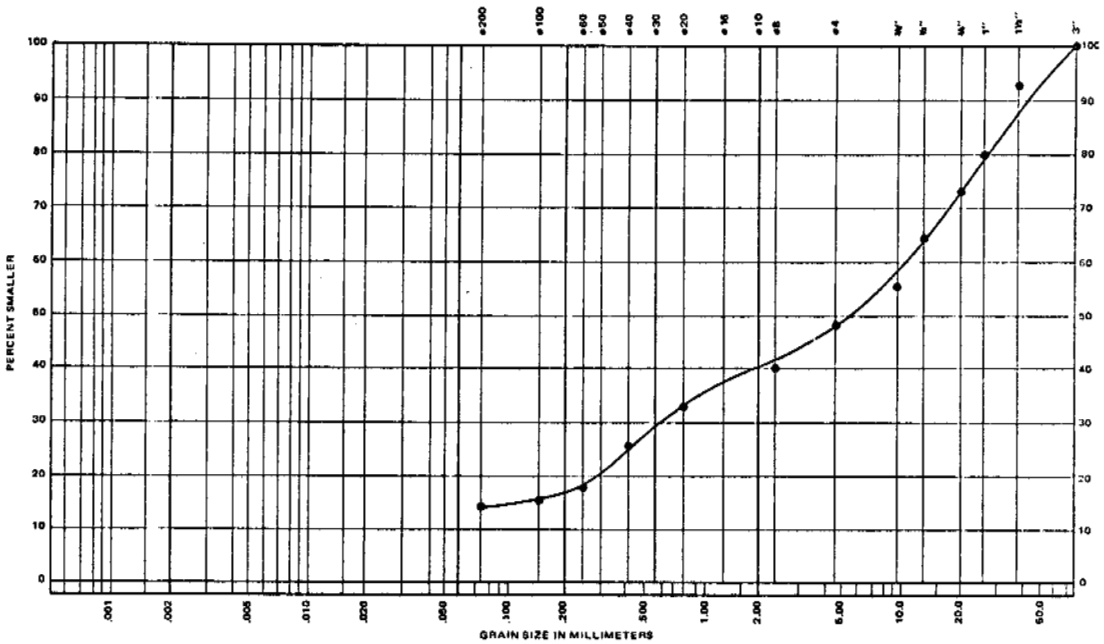
DRILLING METHOD: AUGER

THAW DEPTH: 2.5'

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

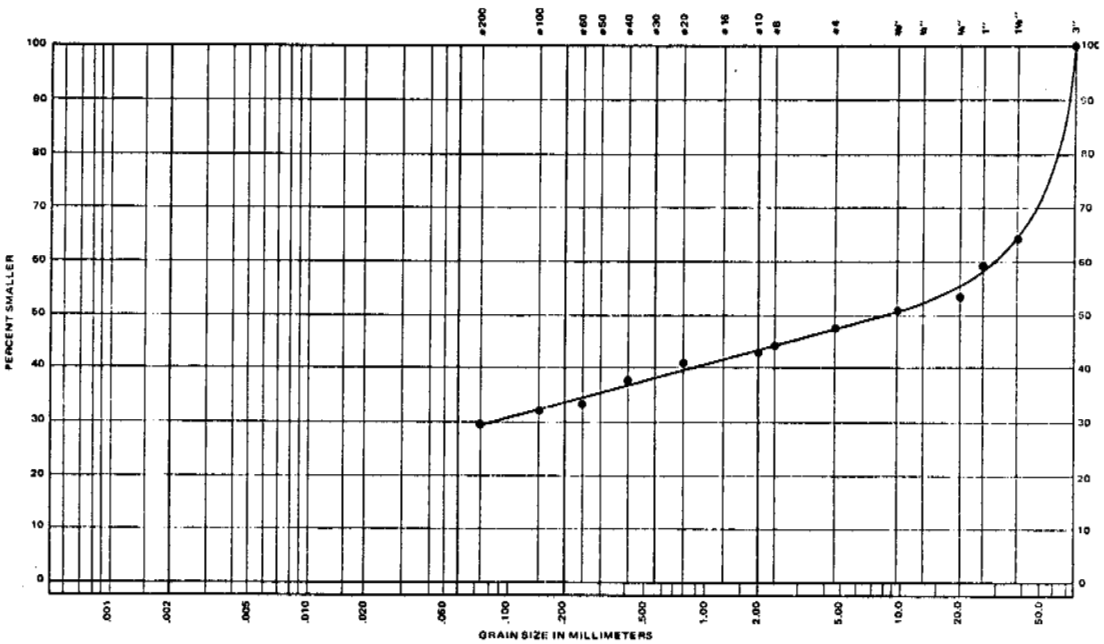


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Gravel and Sand and Some Silt (GW-GM)

PROJECT Granular Resources
JOB No. E666 DATE December 6/73
SAMPLE No. TP 1131-1
DEPTH Surface

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

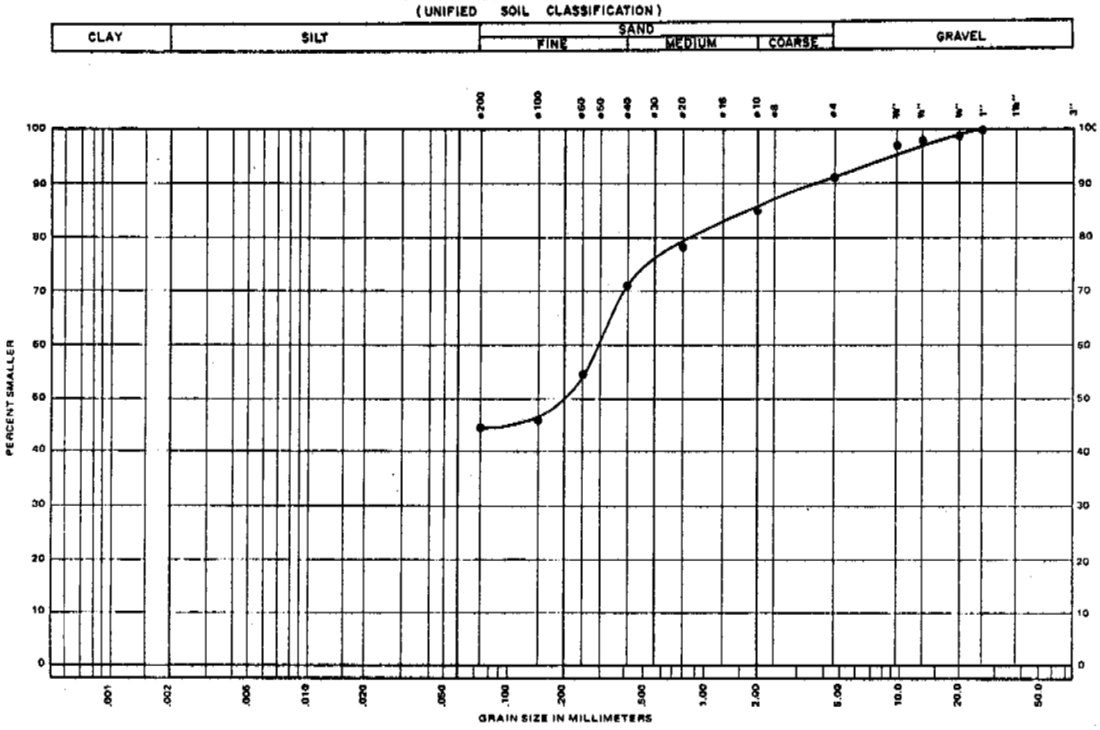


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Gravel and Silt and Some Sand (GM) M/C = 2.1% - 18.1%

PROJECT Granular Resources
JOB No. E666 DATE December 5/73
SAMPLE No. TP 1131-2
DEPTH 2'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Sand and Silt with a Trace of Gravel (SM-ML) M/C = 16.8%

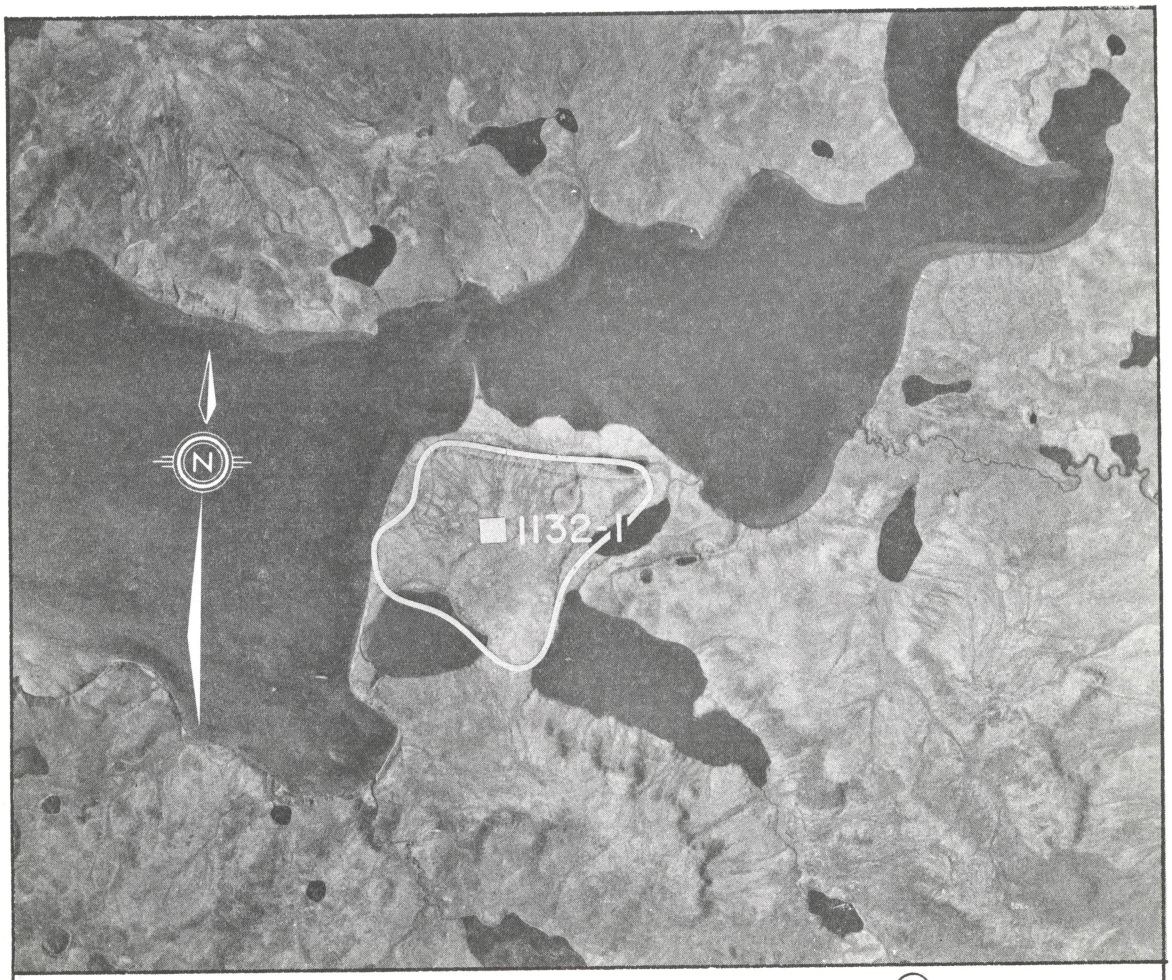
PROJECT Granular Resources
JOB No. E666 DATE December 7/73
SAMPLE No. TP 1131-4
DEPTH 3'

SITE 1132a

Location: Site 1132 is situated 12 miles NE of Travaillant Lake on the south shore of a large unnamed lake. The proposed highway route is 14 miles south of the site.

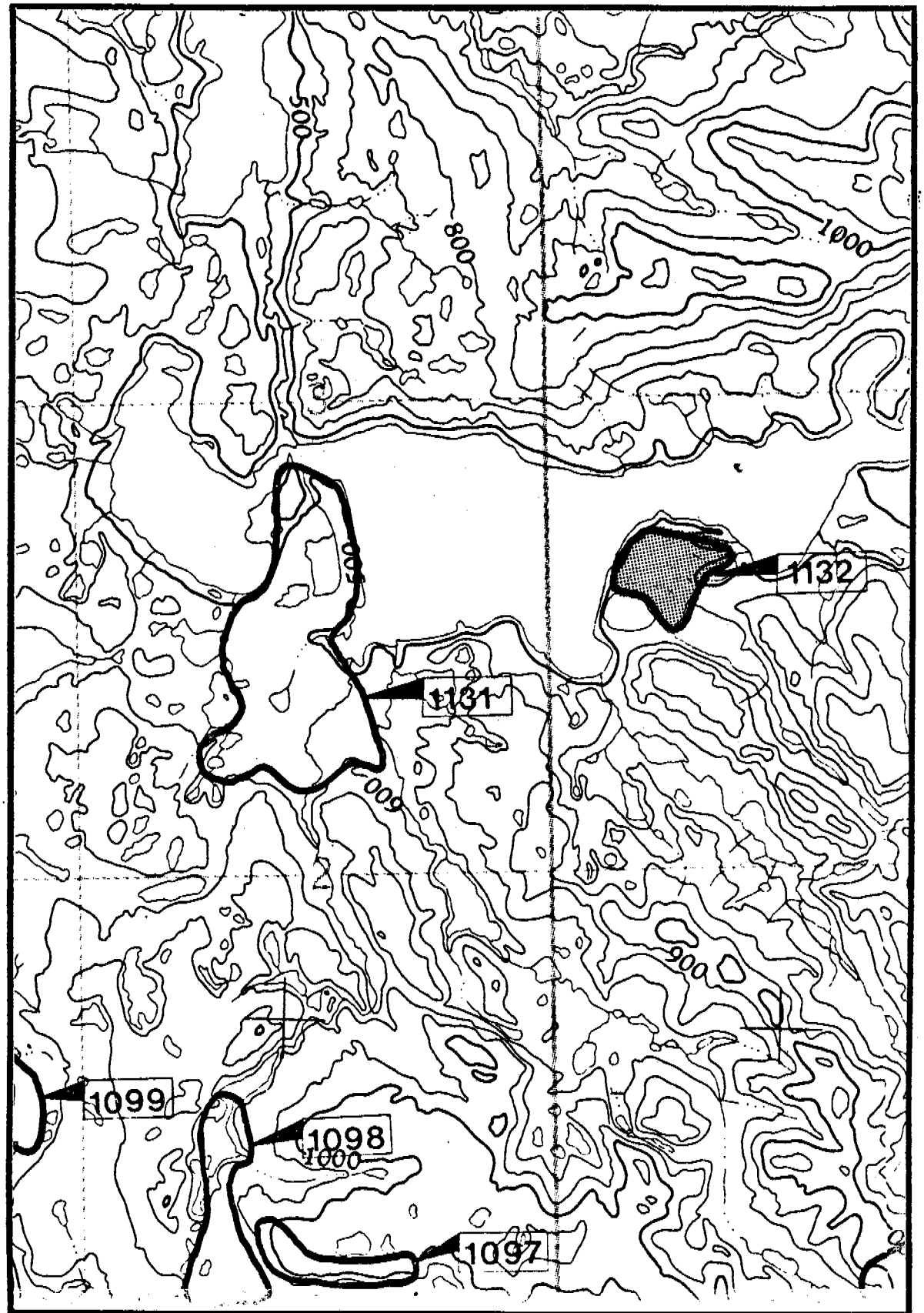
Material: Clayey sand.

Assessment: The material at the site is of poor quality and is unsuitable for construction purposes. Site 1132 is not recommended for development.



□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A21583-153 SCALE: 1" = 5500' (approx.)



SITE LIMITS

PROPOSED GAS PIPELINE

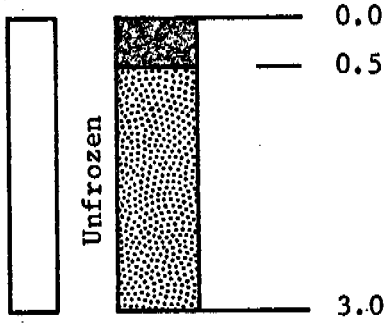
PROPOSED MACKENZIE HIGHWAY

MAPS: TRAVAILLANT LAKE 106-O

SCALE: 1:125,000

TEST PIT LOG

TP 1132-1



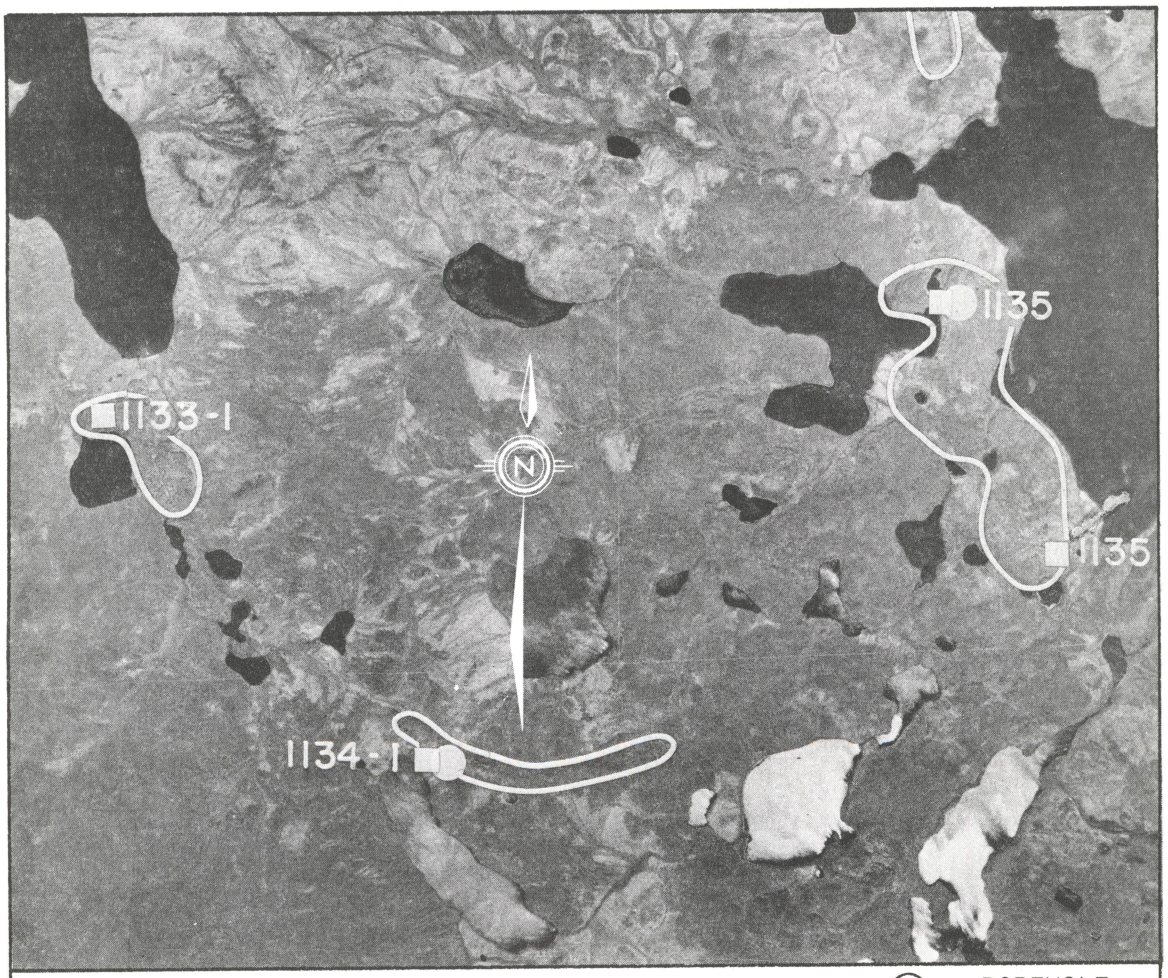
0.0 Moss

0.5 Clayey Sand, light brown
very wet

3.0

SITE 1133

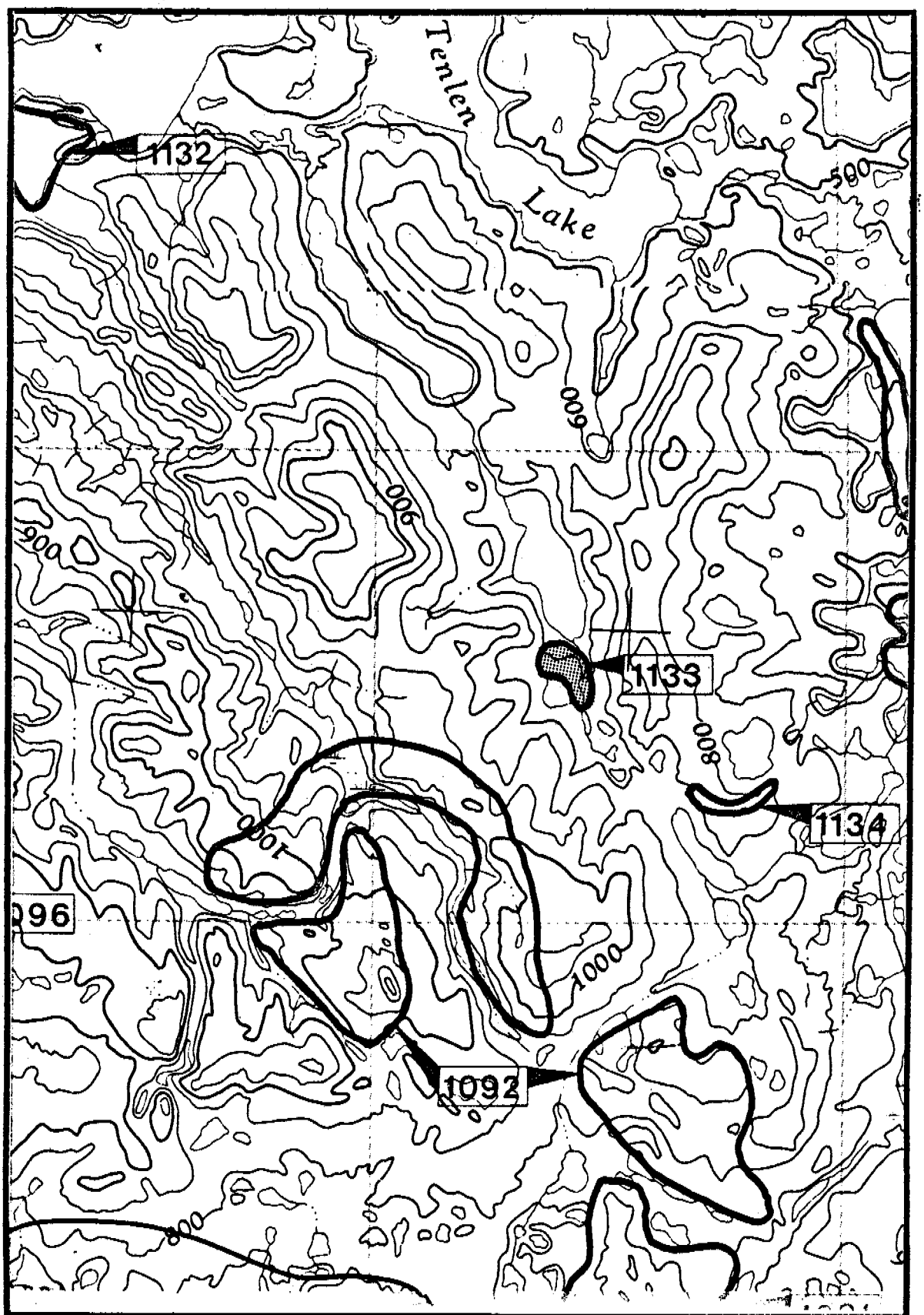
Location:	Site 1133 is situated south of an unnamed lake 7 miles south of Tenlen Lake. The proposed highway route is 8.5 miles south of the site.
Geology:	Site is a small outwash deposit which is thought to be quite uniform.
Material:	Sand, some gravel, some silt, well graded.
Volume:	675,000 cu. yd., estimate is conservative.
Area:	140 acres.
Drainage:	The site is well drained into a nearby lake.



□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A21586-13 SCALE: 1" = 5500' (approx.)

Assessment: Site 1133 contains fair quality material but is located a great distance from presently proposed construction sites. Overburden is patchy and thin but a dense tree cover will have to be removed for disposal. The site has a low environmental sensitivity rating. Drilling will be necessary to prove the deposit. Unless material shortages are critical the long haulage distance renders the feasibility of developing site 1133 unlikely.



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: TRAVAILLANT LAKE 106-O

SCALE: 1:125,000

SITE 1133

ENVIRONMENTAL SENSITIVITY INDEX

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	TERRAIN 1 (2) 3 4 5 Rating: 10	Formation Stability Ice Content	Flat Land, Terrace, Knoll, Rolling, Outcrop, Ridge, Scarp, Overburden Type & Depth, Wet Site, Dry Site.
5	VEGETATION 1 (2) 3 4 5 Rating: 10	Aesthetic Value Habitat Value	Marsh Black Spruce Muskeg White Spruce Mixed Conifer Conifer - Deciduous Deciduous Dry Slopes Riparian
15	MAMMALS 1 (2) 3 4 5 Rating: 30	Ungulates Furbearers Carnivores Small Mammals	Winter Range, Summer Range, Migration Route, Denning Area, Dams and Lodges, Special Habitat Use.
10	BIRDS 1 (2) 3 4 5 Rating: 20	Waterfowl-Swans, Geese, Ducks Game Birds Raptors Shorebirds Passerine	Migration Pathway, Moulting, Spring Staging, Fall Staging, Nesting-Brooding, Perching, Winter Habitat.
10	FISHERY 1 (2) 3 4 5 Rating: 20	Lakes, Tributaries Mackenzie River: Whitefish / Smelt Grayling / Sculpin Pike / Goldeye Trout-Perch / Chub Lake Trout / Dace Burbot / Walleye Suckers / Char Stickleback / Cisco	Spawning, Nursery, Feeding, Overwintering. Major Migration Route. Siltation of Spawning Areas, Benthic Communities. Toxic Material Spill. Slumps, Velocity Increments, Migration Barriers. Eutrophication. Blasting.
5	ARCHAEOLOGY 1 (2) 3 4 5 Rating: 10	Paleontology Pre-Historic Historic	Probability of Discovery. Low, Medium, High. Known Sites.
10	AESTHETICS (1) 2 3 4 5 Rating: 10	Visible from: Physical Disturbance	River, Highway, Air. Dust, Waste, Stockpiles, Noises.
15	RESOURCE UTILIZATION 1 (2) 3 4 5 Rating: 30	Fort Good Hope Arctic Red R. Inuvik	Improved Access. Traplines. Hunting. Fishing. Domestic. Commercial.
15	ASSOCIATED DISTURBANCES 1 2 3 (4) 5 Rating: 60	Access Roads Miles From Highway Miles From Pipeline Hydrologic Alterations Continued Use For Maintenance.	0-2, 2-5, 5-10, 10+ 0-2, 2-5, 5-10, 10+ Cuts and Fills. Creek Crossings. Compaction, Slumping, Erosion. Stockpiles, Waste, Dust.
10	RESTORATION (1) 2 3 4 5 Rating: 10	Soil Stabilization Visual Improvement Habitat Replacement	Natural Regeneration. Grass-Legume Seeding. Transplants. Sustained Maintenance. Erosion Control Systems.

R.I.R. - Relative Importance Units - Base of 100 units.

NOTE: SENSITIVITY INDEX RANGE

MINIMAL SENSITIVITY		MAXIMUM SENSITIVITY
100	TO	500

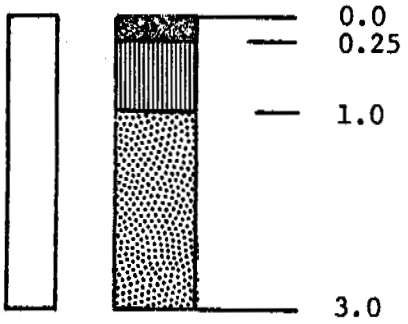
TOTAL INDEX: 210

SPECIAL CONCERNS: Straddles valley bottom near lake. Buffer zones may be required.

F.F. SLANEY & COMPANY LIMITED
VANCOUVER, B. C.

TEST PIT LOG

TP 1133-1



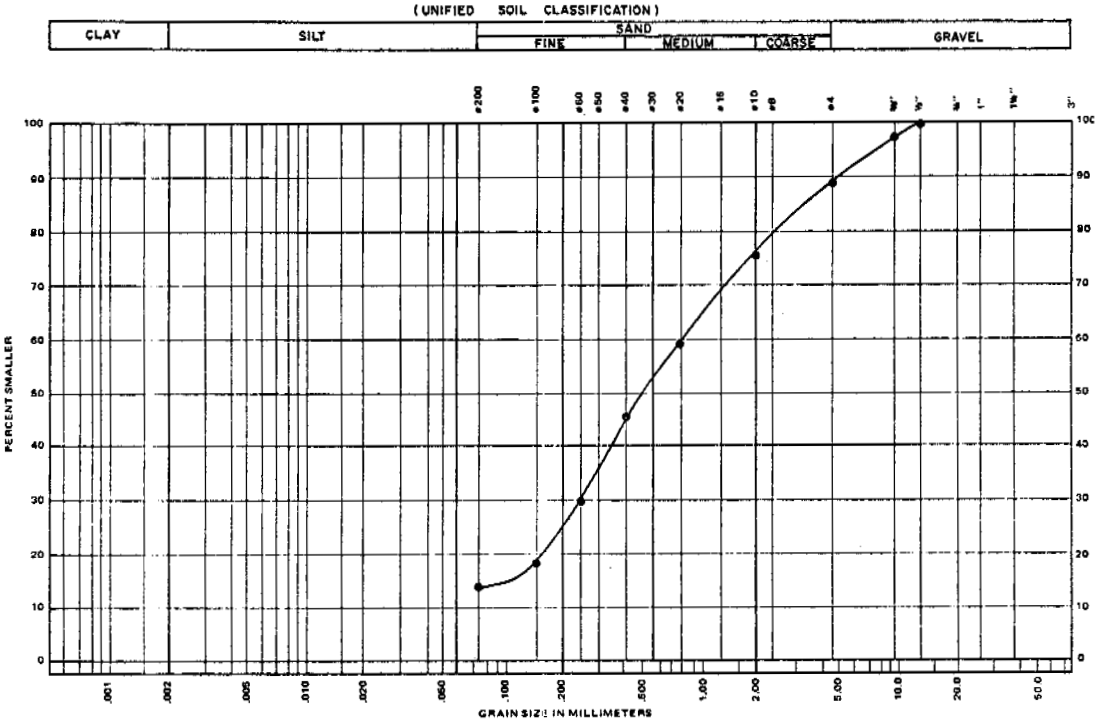
Peat, black

Silt, reddish brown
trace of sand, low plasticity

Sand, grey, coarse to fine grained
trace of gravel
some silt

12% GRAVEL
74% SAND
14% SILT & CLAY

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Sand and Some Silt and Gravel (SW-SM) M/C = 7.2%

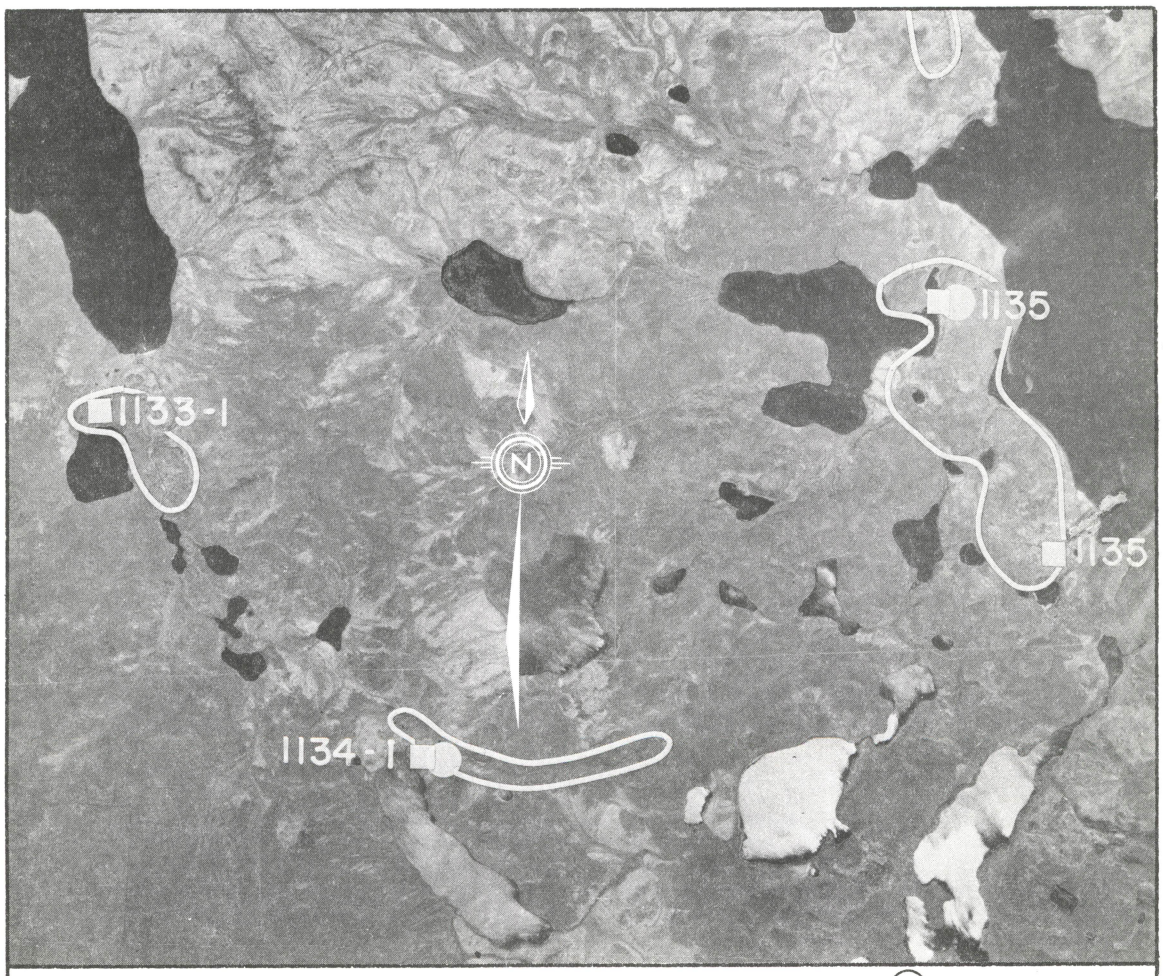
PROJECT Granular Resources
JOB No. E666 DATE December 16/73
SAMPLE No. TP 1133-1
DEPTH 3'

SITE 1134a

Location: Site 1134 is situated 8 miles south of Tenlen Lake. Proposed highway and pipeline routes are 7 and 13 miles to the SEE respectively.

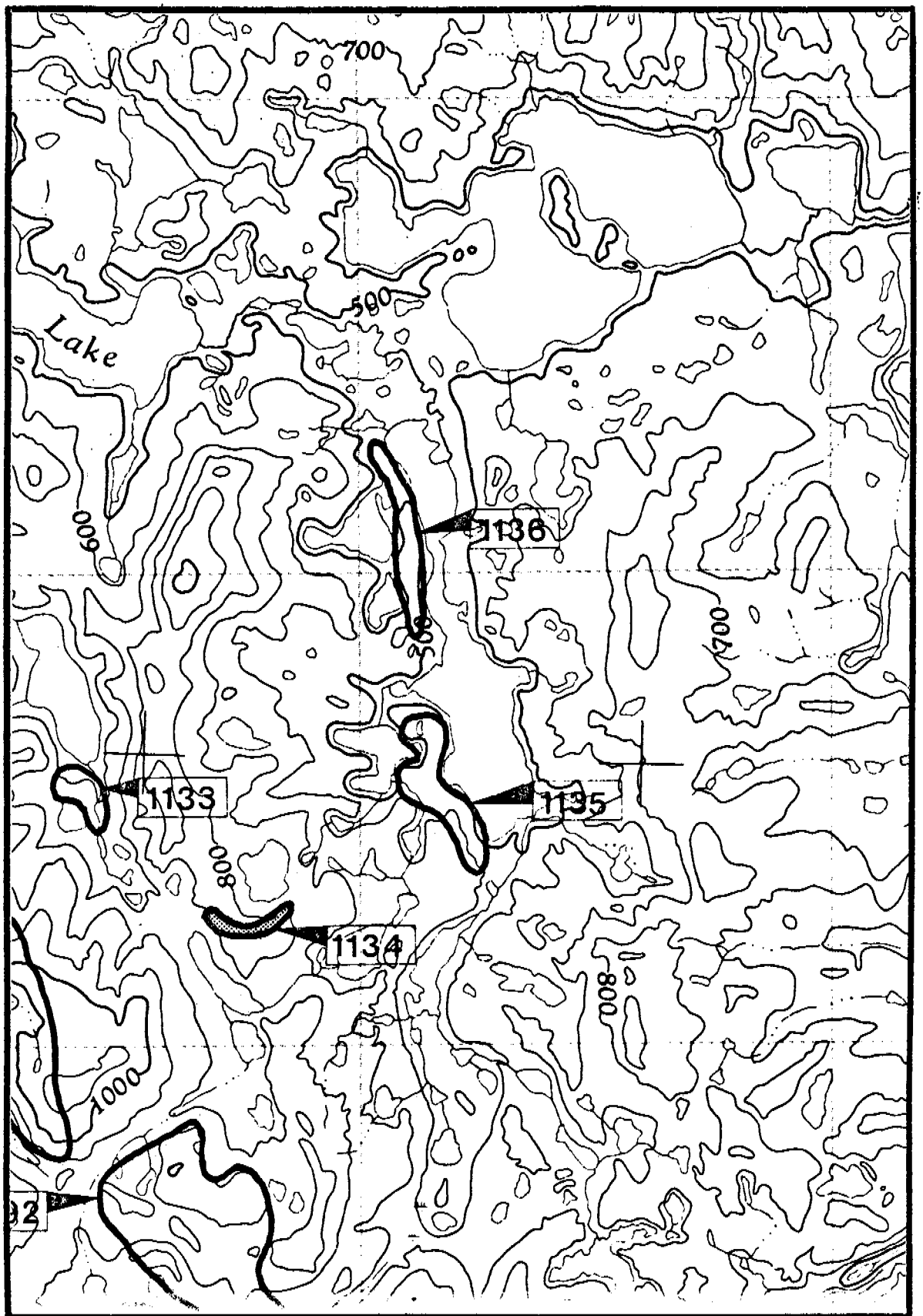
Material: Clay.

Assessment: The material at this site is unsuitable for construction purposes. The site is not recommended for development.



□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A21586-13 SCALE: 1" = 5500' (approx.)



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: TRAVAILLANT LAKE 106-O

SCALE: 1:125,000

GRANULAR MATERIALS INVENTORY - STAGE III

SITE NO. 1134 HOLE NO. 1 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
1	ML	SILT -orange-brown	NOT FROZEN		1
2	ML	SILT -some clay, some sand, some gravel, maximum 2", subrounded, brown grey			2
3					3
4		-many cobbles			4
5					5
6					6
7					7
8		END OF HOLE			8
9					9
10					10
11					11
12					12
13					13
14					14
15					15
16					16
17					17

DATE DRILLED: Seo. 23/73 LOGGED BY: EBA 137-1 COMPLETION DEPTH: 7.0'

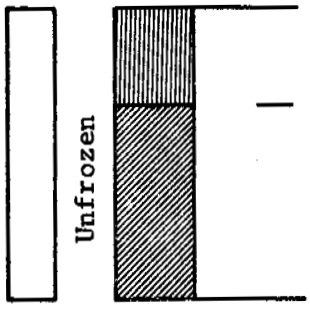
DRILLING METHOD: AUGER THAW DEPTH: N/A

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

TEST PIT LOG

TP 1134-1



0.0

Silt, reddish brown
some organics

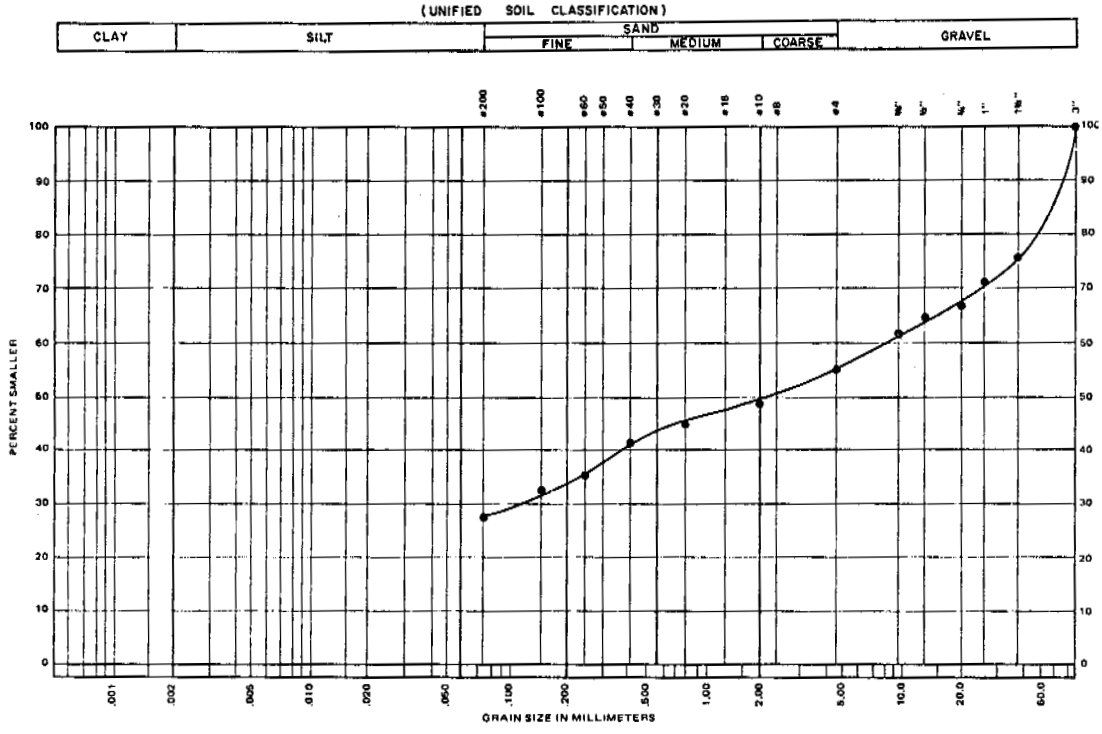
1.0

Clay, grey, silty, medium plasticity
gravelly with cobbles,
(glacial till), layers of light
brown silt

3.0

45% GRAVEL
28% SAND
27% SILT & CLAY

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Silty Sandy Gravel (GM) M/C = 7.1%

PROJECT Granular Resources
JOB No. E666 DATE December 10/73
SAMPLE No. TP 1134-1
DEPTH 3'

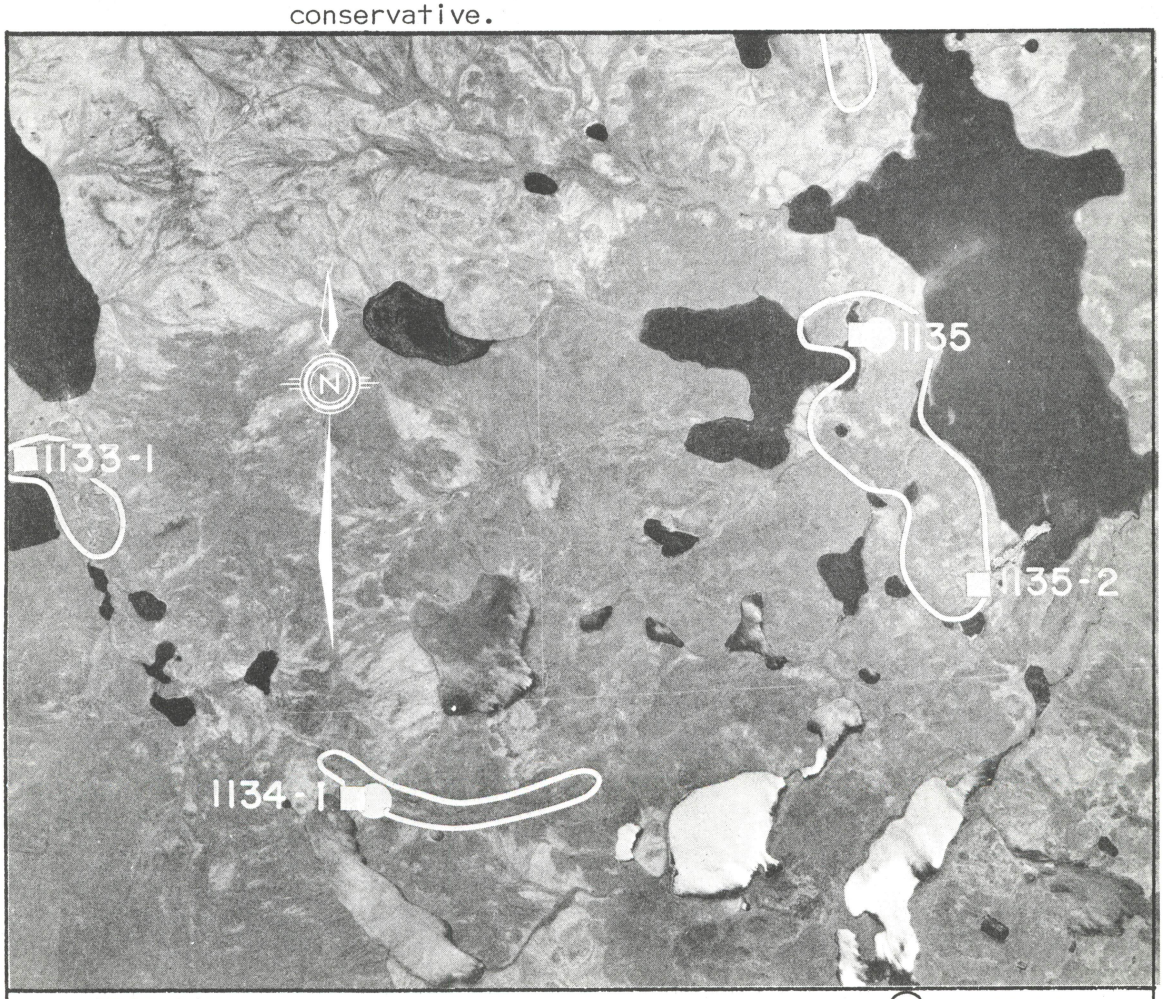
SITE 1135

Location: Site 1135 is located along the SW shore of a large unnamed lake 18 miles north of the point of confluence of the Thunder and Mackenzie Rivers. Proposed highway and pipeline routes are 9.5 miles and 17 miles south-west and south of the site respectively.

Geology: Site 1135 is a moderately large outwash deposit.

Material: Sand and gravel, some silt, silt content increases with depth, well graded.

Volume: 15,125,000 cu. yd., volume estimate may be conservative.



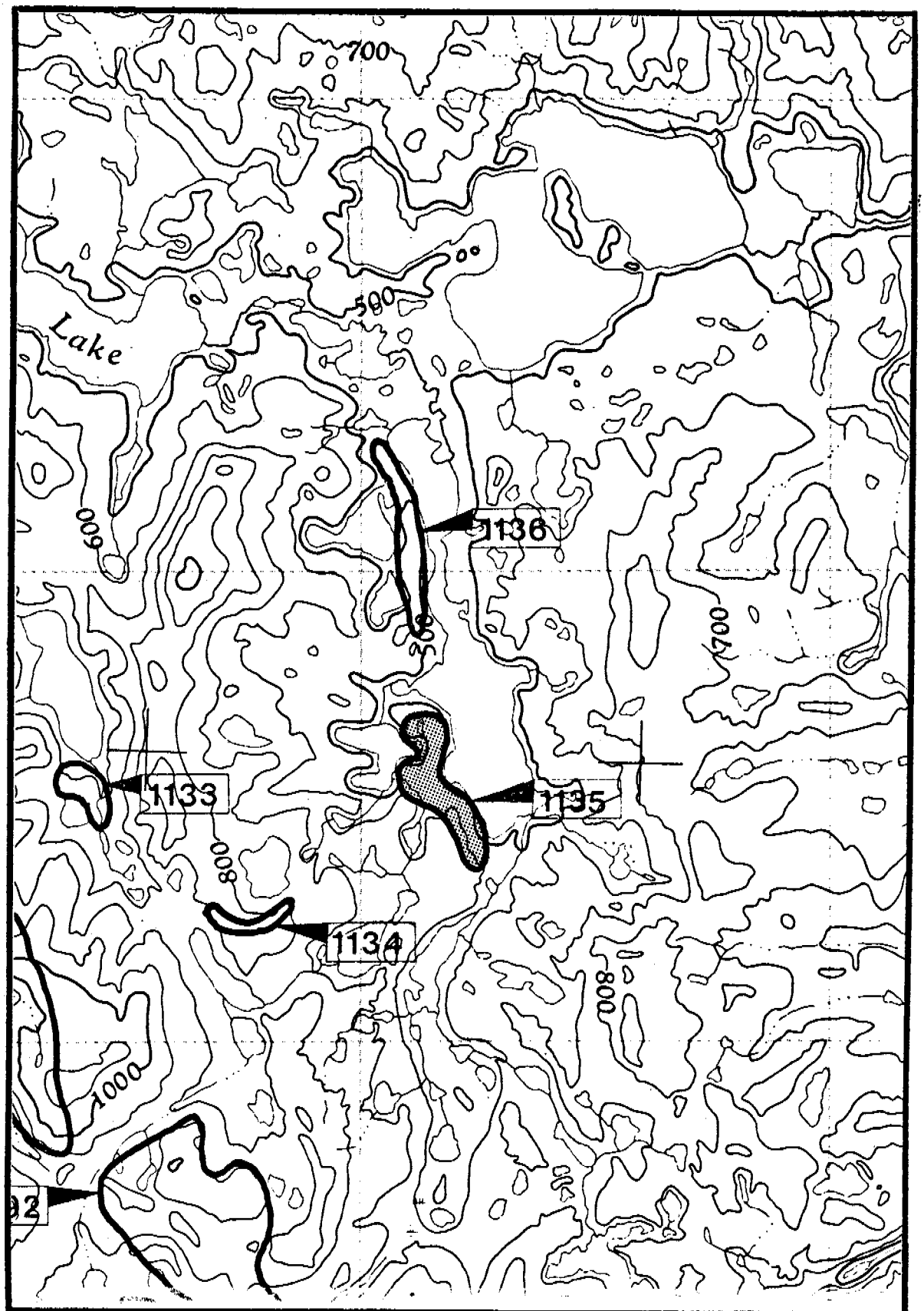
□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A21586-13 SCALE: 1" = 5500' (approx.)

Area: 625 acres.

Drainage: Drainage into nearby lakes is fair.

Assessment: Site 1135 contains a relatively large volume of fair to good quality borrow which is expected to be quite uniform. Unfortunately the exploitable material is very thin, probably in the range of 4 to 6 feet, thus a large area would have to be worked in order to make development feasible. Material suitable for processing into concrete aggregate is available from this site. Processing will require screening the fraction above the 1/4 inch seive, washing it, and then crushing to obtain a sand fraction. Overburden is negligible however dense birch and spruce tree cover will have to be removed for disposal. Permafrost was encountered below 8.5 ft. The site has a moderately low environmental sensitivity rating. Haulage distance to proposed highway and pipeline routes is very long and access difficult due to hilly, thermally sensitive terrain. Winter operations will be necessary. Unless materials are in short supply the long haulage distance and shallow depth of usable gravel renders the feasibility of developing site 1135 questionable.



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: TRAVAILLANT LAKE 106-O

SCALE: 1:125,000

SITE 1135

ENVIRONMENTAL SENSITIVITY INDEX

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	TERRAIN (1) 2 3 4 5 Rating: 5	Formation Stability Ice Content	Flat Land, Terrace, Knoll, Rolling, Outcrop, Ridge, Scarp, Overburden Type & Depth, Wet Site, Dry Site.
5	VEGETATION 1 2 (3) 4 5 Rating: 15	Aesthetic Value Habitat Value	Marsh Black Spruce Muskeg White Spruce Mixed Conifer Conifer - Deciduous Deciduous Dry Slopes Riparian
15	MAMMALS 1 (2) 3 4 5 Rating: 30	Ungulates Furbearers Carnivores Small Mammals	Winter Range, Summer Range, Migration Route, Denning Area, Dams and Lodges, Special Habitat Use.
10	BIRDS 1 (2) 3 4 5 Rating: 20	Waterfowl-Swans, Geese, Ducks Game Birds Raptors Shorebirds Passerine	Migration Pathway, Moulting, Spring Staging, Fall Staging, Nesting-Brooding, Perching, Winter Habitat.
10	FISHERY 1 2 3 (4) 5 40 Rating:	Lakes, Tributaries Mackenzie River: Whitefish / Smelt Grayling / Sculpin Pike / Goldeye Trout-Perch / Chub Lake Trout / Dace Burbot / Walleye Suckers / Char Stickleback / Cisco	Spawning, Nursery, Feeding, Overwintering. Major Migration Route. Siltation of Spawning Areas, Benthic Communities. Toxic Material Spill. Slumps, Velocity Increments, Migration Barriers. Eutrophication. Blasting.

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	ARCHAEOLOGY 1 (2) 3 4 5 Rating: 10	Paleontology Pre-Historic Historic	Probability of Discovery. Low, Medium, High. Known Sites.
10	AESTHETICS (1) 2 3 4 5 Rating: 10	Visible from: Physical Disturbance	River, Highway, Air. Dust, Waste, Stockpiles. Noises.
15	RESOURCE UTILIZATION 1 (2) 3 4 5 Rating: 30	Fort Good Hope Arctic Red R. Inuvik	Improved Access. Traplines. Hunting. Fishing. Domestic. Commercial.
15	ASSOCIATED DISTURBANCES 1 2 3 (4) 5 Rating: 60	Access Roads Miles From Highway Miles From Pipeline Hydrologic Alterations Continued Use For Maintenance.	0-2, 2-5, 5-10, 10+ 0-2, 2-5, 5-10, 10+ Cuts and Fills. Creek Crossings. Compaction. Slumping, Erosion. Stockpiles. Waste, Dust.
10	RESTORATION (1) 2 3 4 5 Rating 10	Soil Stabilization Visual Improvement Habitat Replacement	Natural Regeneration. Grass-Legume Seeding. Transplants. Sustained Maintenance. Erosion Control Systems.

NOTE: SENSITIVITY INDEX RANGE

MINIMAL SENSITIVITY		MAXIMUM SENSITIVITY
100	TO	500

R.I.R. - Relative Importance Units - Base of 100 units.

TOTAL INDEX: 230

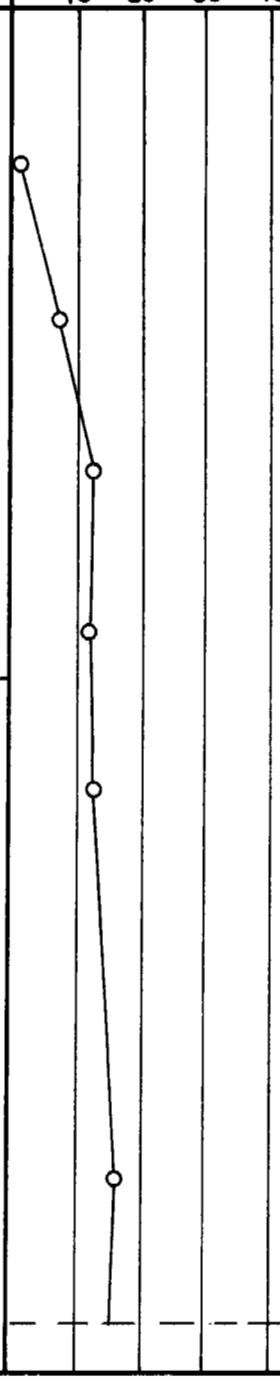
SPECIAL CONCERNS: Straddles lake drainage. Buffer zones and siltation controls recommended.

F.F. SLANEY & COMPANY LIMITED
VANCOUVER, B. C.

GRANULAR MATERIALS INVENTORY - STAGE III

SITE NO. 1135 HOLE NO. 1 PAGE 1 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION
1	GW-GM	GRAVEL -sandy, silty, maximum 2", average 3/4 ", angular, grey-brown (top 8" are orange-brown) (2') 35% GRAVEL, 56% SAND, 9% SILT & CLAY -very sandy and silty 14.6% O. C. (4') 39% GRAVEL, 49% SAND, 12% SILT & CLAY	NOT FROZEN
5	SM	SAND & SILT -some gravel, sand fine to predominantly coarse, very wet (soupy), grey-brown. (6'+8') 16% GRAVEL, 57% SAND, 27% SILT & CLAY -trace gravel, medium grained sand -no gravel	FROZEN
17			



DATE DRILLED: Sep. 22/73 | LOGGED BY: EBA 136-1 | COMPLETION DEPTH: 25.0'

DRILLING METHOD: AUGER | THAW DEPTH: 8.8'

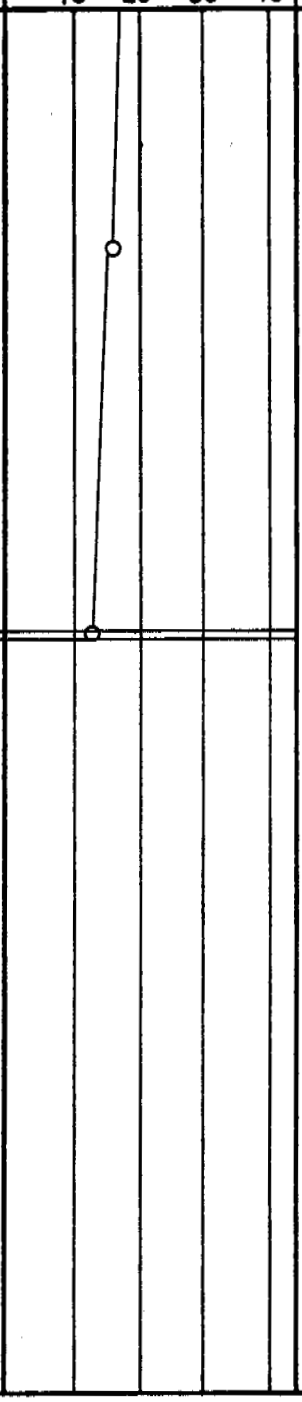
GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY - STAGE III

SITE NO. 1135 HOLE NO. 1 PAGE 2 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
18	SM	SAND & SILT - same	FROZEN		18
19					19
20					20
21					21
22					22
23					23
24					24
25					25
26		END OF HOLE			26
27					27
28					28
29					29
30					30
31					31
32					32
33					33
34					34



DATE DRILLED: Sep. 22/73

LOGGED BY: EBA 136-1

COMPLETION DEPTH: 25.0'

DRILLING METHOD: AUGER

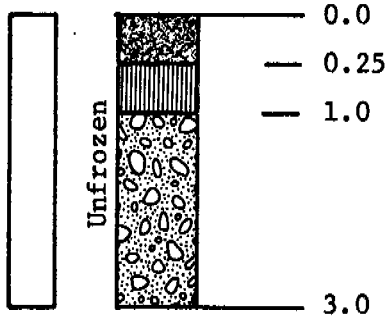
THAW DEPTH: 8.8'

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

TEST PIT LOG

TP 1135-1



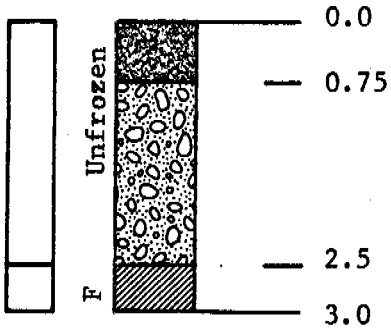
Peat, dark brown, fibrous

Silt, light brown, gravelly

Gravel, medium brown, well graded
sandy
trace of silt

45% GRAVEL
48% SAND
7% SILT & CLAY

TP 1135-2



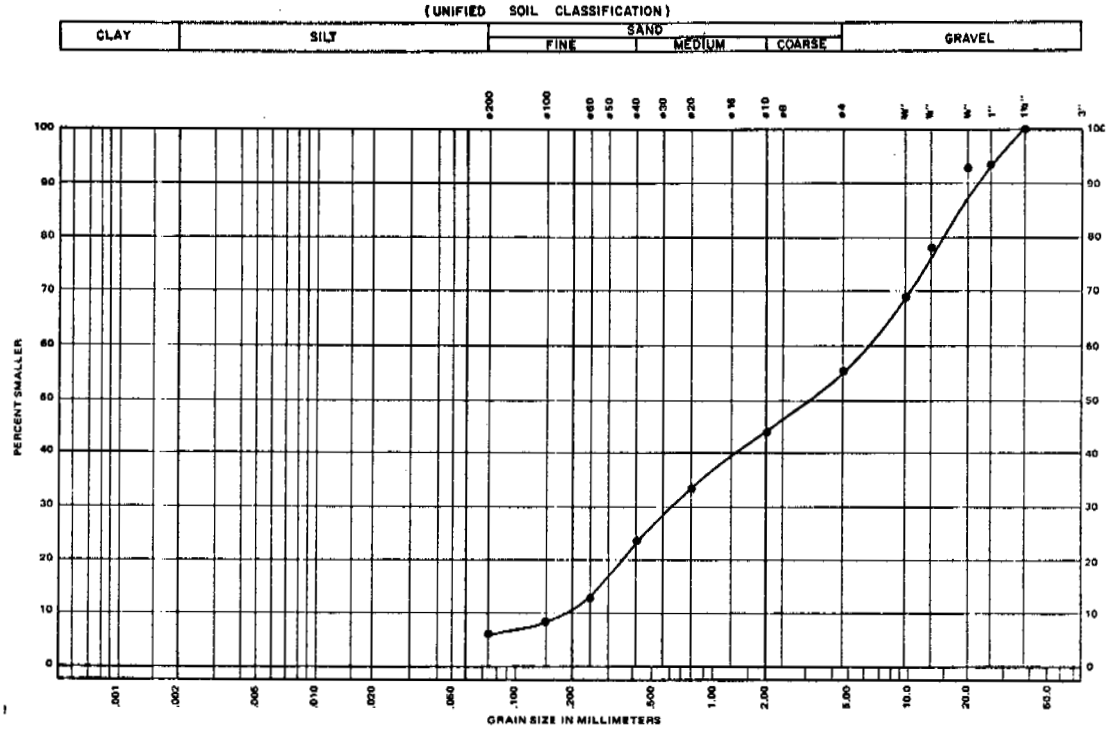
Peat, black, fibrous

Gravel, coarse, medium brown
sandy
well graded

57% GRAVEL
28% SAND
15% SILT & CLAY

Clay, grey, silty

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

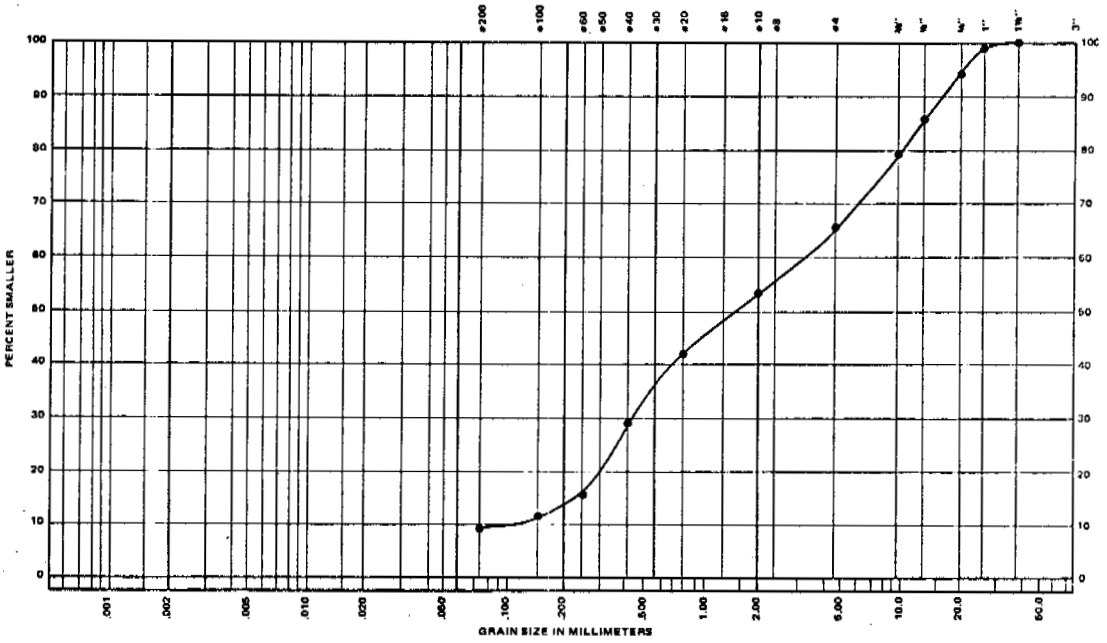


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Sand and Gravel with a Trace of Silt

PROJECT Granular Resources
JOB No. E666 DATE December 6/73
SAMPLE No. TP 1135-1
DEPTH 3'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

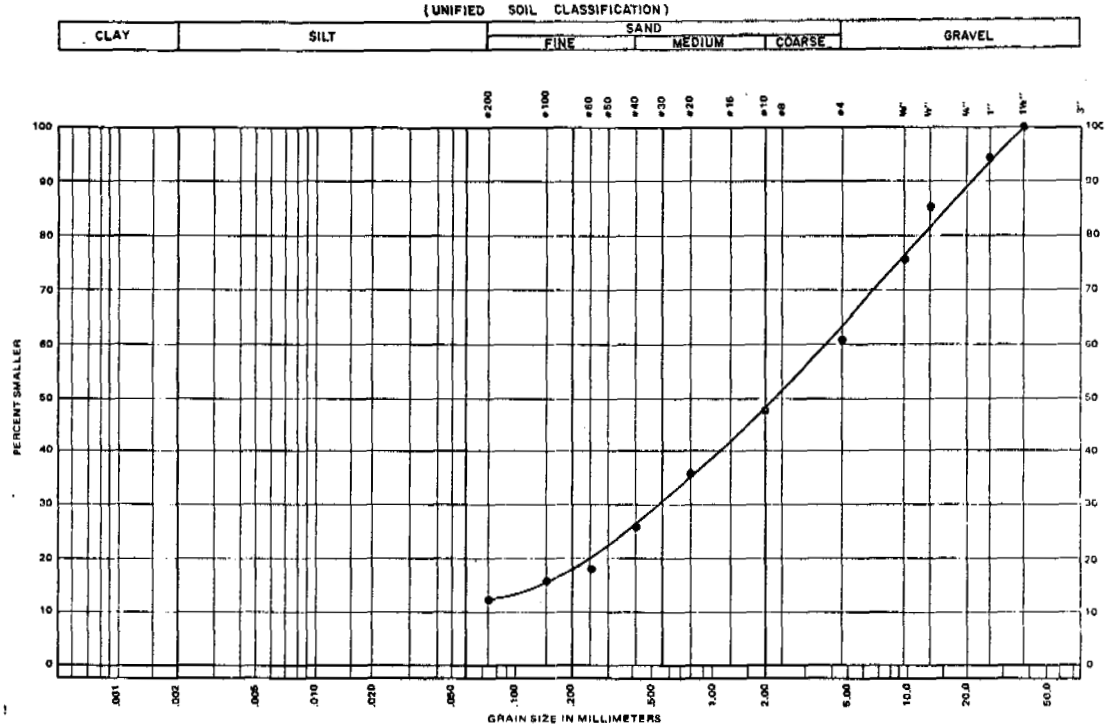


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Sand and Gravel with a Trace of Silt (GW-GM)

PROJECT Granular Resources
JOB No. E666 DATE January 11/74
SAMPLE No. BH 1135-1
DEPTH 2'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

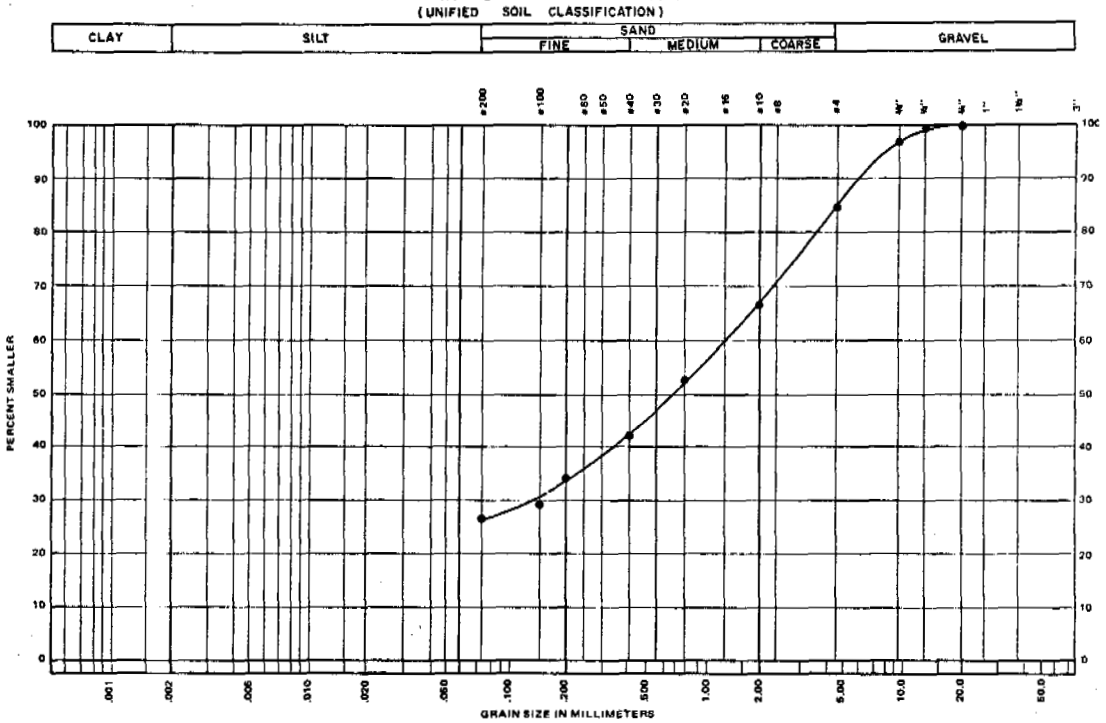


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Sand and Gravel and Some Silt (GN-GM)

PROJECT Granular Resources
JOB No. E666 DATE January 11/74
SAMPLE No. BH 1135-1
DEPTH 4'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

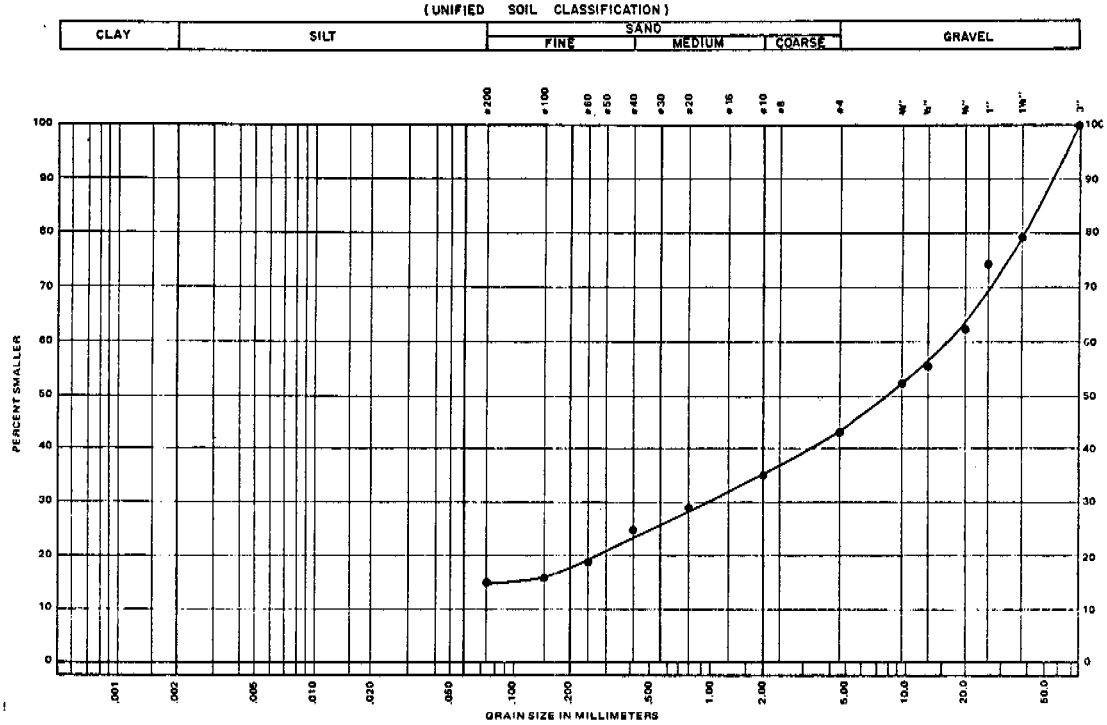


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Silty Sand and Some Gravel (SM)

PROJECT Granular Resources
JOB No. E666 DATE January 11/74
SAMPLE No. BH 1135-1
DEPTH 6' + 8'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Sandy Gravel and Some Silt (GM) N/C = 24.5%

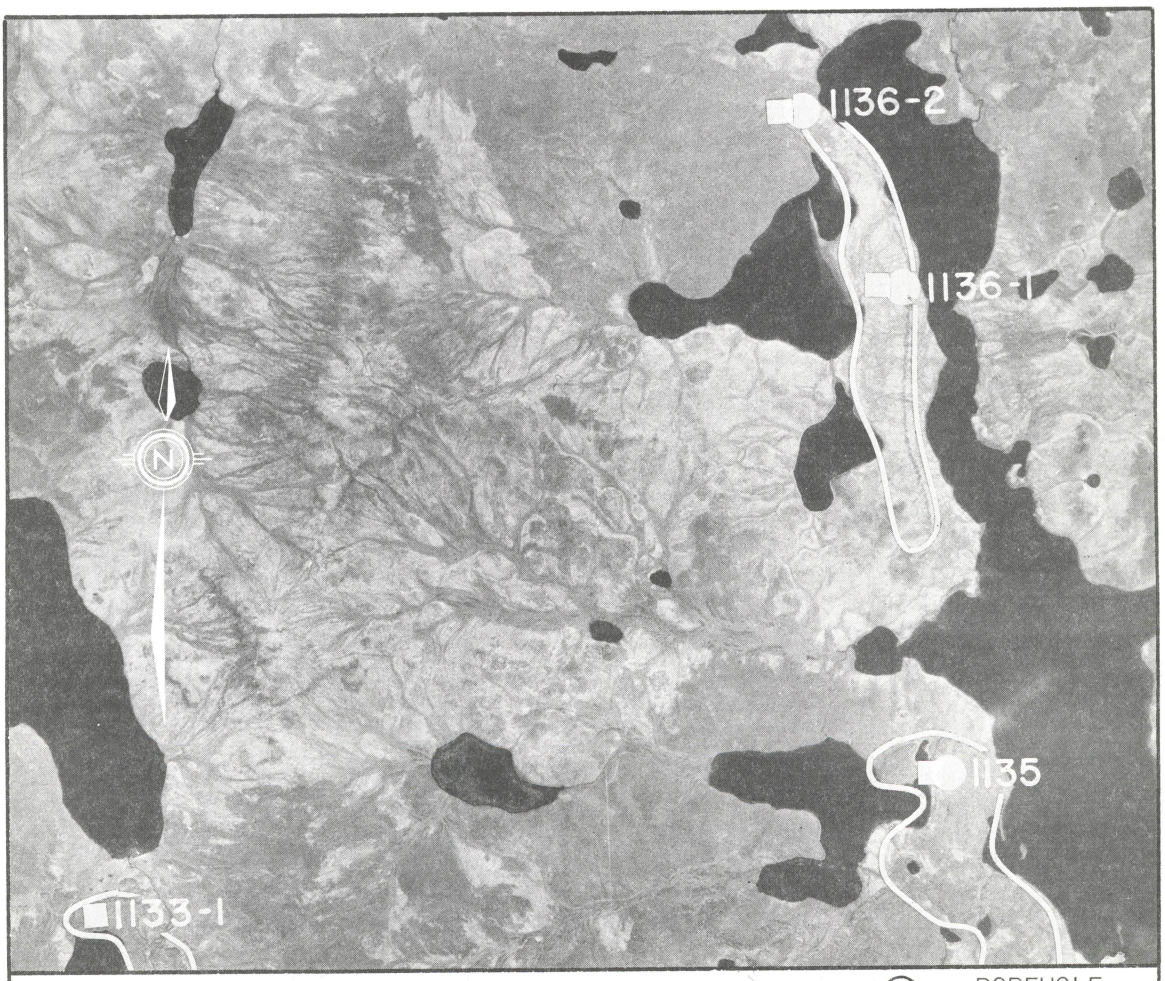
PROJECT Granular Resources
JOB No. E666 DATE December 10/73
SAMPLE No. TP 1135-2
DEPTH 2.5'

PETROGRAPHIC ANALYSIS

Limestone	22%
Dolomite	5%
Sandstone	24%
Shale	13%
Quartzite	5%
Granite	19%
Basalt	9%
Others	3%

SITE 1136

Location:	Site 1136 is situated 21 miles north of the point of confluence of the Thunder and Mackenzie Rivers. The proposed highway route is 12 miles SSE of the site.
Geology:	Site 1136 is a high, marshy fossil terrace.
Material:	Sand, gravel content variable, silt content variable, grading variable.
Volume:	12,000,000 cu. yd., estimate is realistic.
Area:	300 acres.

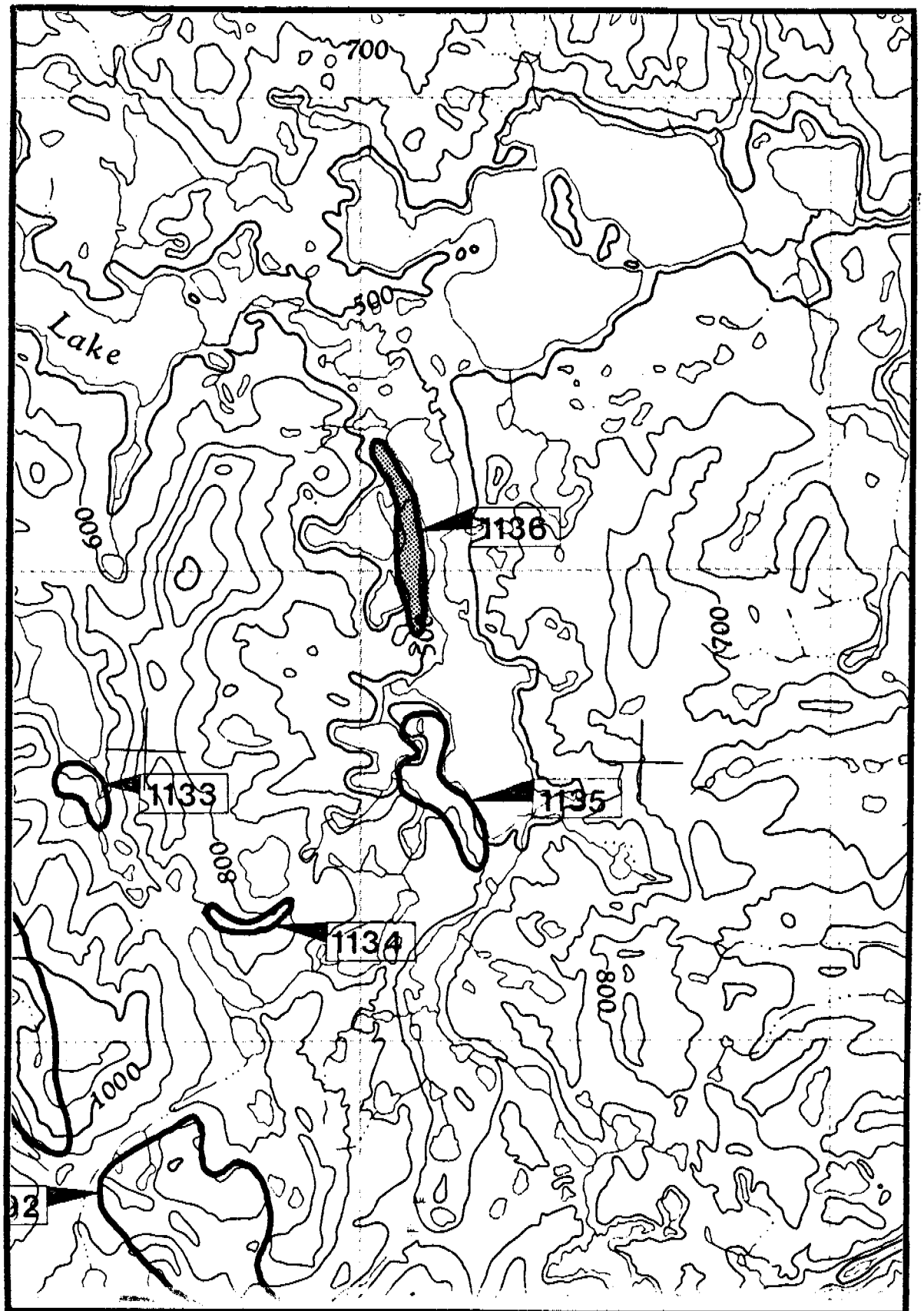


□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A21586-13 SCALE: 1" = 5500' (approx.)

Drainage: The site is poorly drained.

Assessment: The borrow material at site 1136 is of high volume and of fair quality useful as general fill. Moisture contents are high enough that the material would have to be stockpiled and drained before being used. Haulage distance to the highway route is very long and access rather difficult because of hilly, thermally sensitive terrain. Winter operations will be necessary. Peat and silt overburden a few inches thick will have to be stripped and stockpiled for use in restoration. Dense spruce and birch tree cover will have to be removed. The site has been assessed a moderate environmental sensitivity rating. Because of the long haulage distance and rather difficult access it is questionable whether it is feasible to develop site 1136 at the moment. If material shortages are critical the site may be developed within the general borrow pit development guidelines contained in this report.



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: TRAVAILLANT LAKE 106-O

SCALE: 1:125,000

SITE 1136

ENVIRONMENTAL SENSITIVITY INDEX

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	TERRAIN 1 (2) 3 4 5 Rating: 10	Formation Stability Ice Content	Flat Land, Terrace, Knoll, Rolling, Outcrop, Ridge, Scarp, Overburden Type & Depth, Wet Site, Dry Site.
5	VEGETATION (1) 2 3 4 5 Rating: 5	Aesthetic Value Habitat Value	Marsh Black Spruce Muskeg White Spruce Mixed Conifer Conifer - Deciduous Deciduous Dry Slopes Riparian
15	MAMMALS (1) 2 3 4 5 Rating: 15	Ungulates Furbearers Carnivores Small Mammals	Winter Range, Summer Range, Migration Route, Denning Area, Dams and Lodges, Special Habitat Use.
10	BIRDS 1 (2) 3 4 5 Rating: 20	Waterfowl-Swans, Geese, Ducks Game Birds Raptors Shorebirds Passerine	Migration Pathway, Moulting, Spring Staging, Fall Staging, Nesting-Brooding, Perching, Winter Habitat.
10	FISHERY 1 2 3 4 (5) Rating: 50	Lakes, Tributaries Mackenzie River: Whitefish, Smelt Grayling, Sculpin Pike, Goldeye Trout-Perch, Chub Lake Trout, Dace Burbot, Walleye Suckers, Char Stickleback, Cisco	Spawning, Nursery, Feeding, Overwintering. Major Migration Route. Siltation of Spawning Areas, Benthic Communities. Toxic Material Spill. Slumps, Velocity Increments, Migration Barriers. Eutrophication. Blasting.

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	ARCHAEOLOGY (1) 2 3 4 5 Rating: 5	Paleontology Pre-Historic Historic	Probability of Discovery. Low, Medium, High. Known Sites.
10	AESTHETICS (1) 2 3 4 5 Rating: 10	Visible from: Physical Disturbance	River, Highway, Air. Dust, Waste, Stockpiles. Noises.
15	RESOURCE UTILIZATION 1 2 3 (4) 5 Rating: 60	Fort Good Hope Arctic Red R. Inuvik	Improved Access. Traplines. Hunting. Fishing. Domestic. Commercial.
15	ASSOCIATED DISTURBANCES 1 2 3 4 (5) Rating: 75	Access Roads Miles From Highway Miles From Pipeline Hydrologic Alterations Continued Use For Maintenance.	0-2, 2-5, 5-10, 10+ 0-2, 2-5, 5-10, 10+ Cuts and Fills. Creek Crossings. Compaction. Slumping, Erosion. Stockpiles. Waste, Dust.
10	RESTORATION (1) 2 3 4 5 Rating: 10	Soil Stabilization Visual Improvement Habitat Replacement	Natural Regeneration. Grass-Legume Seeding. Transplants. Sustained Maintenance. Erosion Control Systems.

NOTE: SENSITIVITY INDEX RANGE

MINIMAL SENSITIVITY		MAXIMUM SENSITIVITY
100	TO	500

R.I.R. - Relative Importance Units - Base of 100 units.

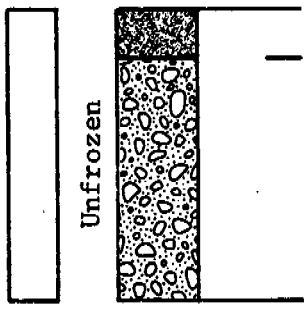
TOTAL INDEX: 270

SPECIAL CONCERNS: Parallels lake edge. Buffer zones and siltation controls recommended to protect shorelines.

F.F. SLANEY & COMPANY LIMITED
VANCOUVER, B. C.

TEST PIT LOG

TP 1136-1



0.0

0.5

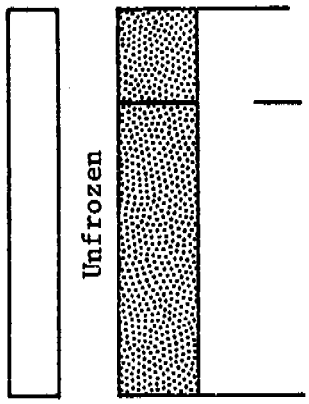
Peat, black, fibrous

Gravel, medium brown
sandy
some clay
pockets of organics

2% GRAVEL
92% SAND
6% SILT & CLAY

3.0

TP 1136-2



0.0

Sand, reddish brown
silty, some organic rootlets

1.5

Sand, dark brown
silty
uniformly graded

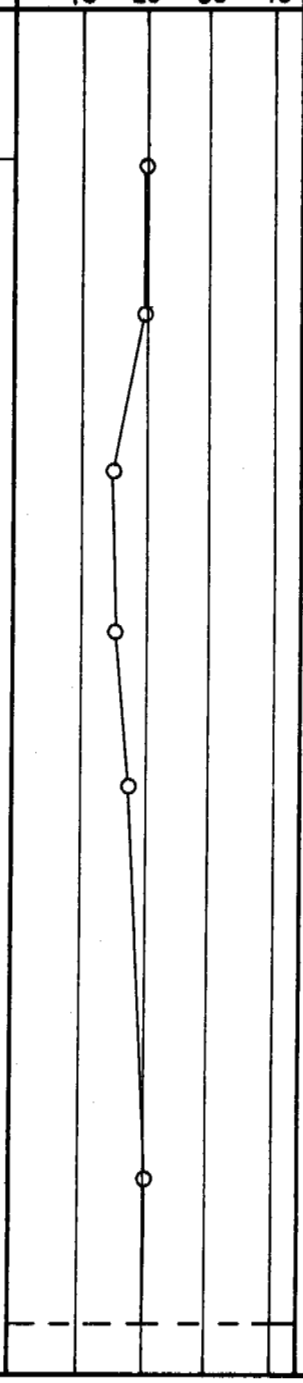
9% GRAVEL
66% SAND
25% SILT & CLAY

4.0

GRANULAR MATERIALS INVENTORY - STAGE III

SITE NO. 1136 | HOLE NO. 1 | PAGE 1 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION
	Pt	PEAT -fibrous, medium brown	NOT FROZEN
1			
		SAND	
2		-silty, fine to medium grained, very, wet, light-medium brown	FROZEN
3			
4	SM	(2'-8') 7% GRAVEL, 68% SAND, 25% SILT & CLAY	
5			
6		-sand size increasing, medium to coarse	
7			
8			
9			
10			
11			
12		(10'-20') 15% GRAVEL, 60% SAND, 25% SILT & CLAY	
13			
14			
15		-very silty, very wet	
16			
17			



DEPTH (feet): 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

DATE DRILLED: Sep. 22/73 | LOGGED BY: EBA 134-2 | COMPLETION DEPTH: 20.5'

DRILLING METHOD: AUGER | THAW DEPTH: 2.0'

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY - STAGE III

SITE NO. 1136 HOLE NO. 1 PAGE 2 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
18	SM	SAND -very silty, very wet			18
19					19
20					20
21		END OF HOLE			21
22					22
23					23
24					24
25					25
26					26
27					27
28					28
29					29
30					30
31					31
32					32
33					33
34					34

DATE DRILLED: Sep. 22/73 LOGGED BY: EBA 134-2 COMPLETION DEPTH: 20.5'

DRILLING METHOD: AUGER THAW DEPTH: 2.0'

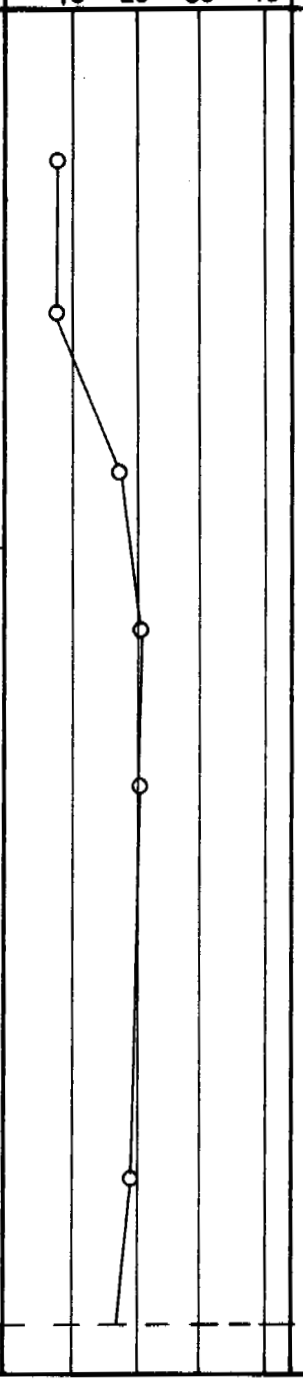
GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1136 HOLE NO. 2 PAGE 1 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION
	OL	TOPSOIL	NOT FROZEN
1	SM	SAND -trace to some silt, medium grained, uniform, light orangey-brown.	
2			
3		-light to medium brown, moist.	
4			
5		(2'-8') 1% GRAVEL 74% SAND 25% SILT & CLAY	
6		-silt content increase, some silt.	
7			FROZEN
8		-silty	
9			
10	SC	-very silty, trace clay, slight plasticity, wet.	
11			
12			
13			
14		(10'-20') 5% GRAVEL 65% SAND 30% SILT & CLAY	
15			
16			
17			



DATE DRILLED: Sep. 22/73 LOGGED BY: EBA 134-1 COMPLETION DEPTH: 26.0 '

DRILLING METHOD: AUGER THAW DEPTH: 7.0'

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1136 HOLE NO. 2 PAGE 2 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
		SAND			
18	SM	-very silty, trace clay, predominantly medium grained, wet, grey-brown to brown.			18
19					19
20					20
21					21
22		-very wet			22
23					23
24					24
25					25
26					26
27		END OF HOLE			27
28					28
29					29
30					30
31					31
32					32
33					33
34					34

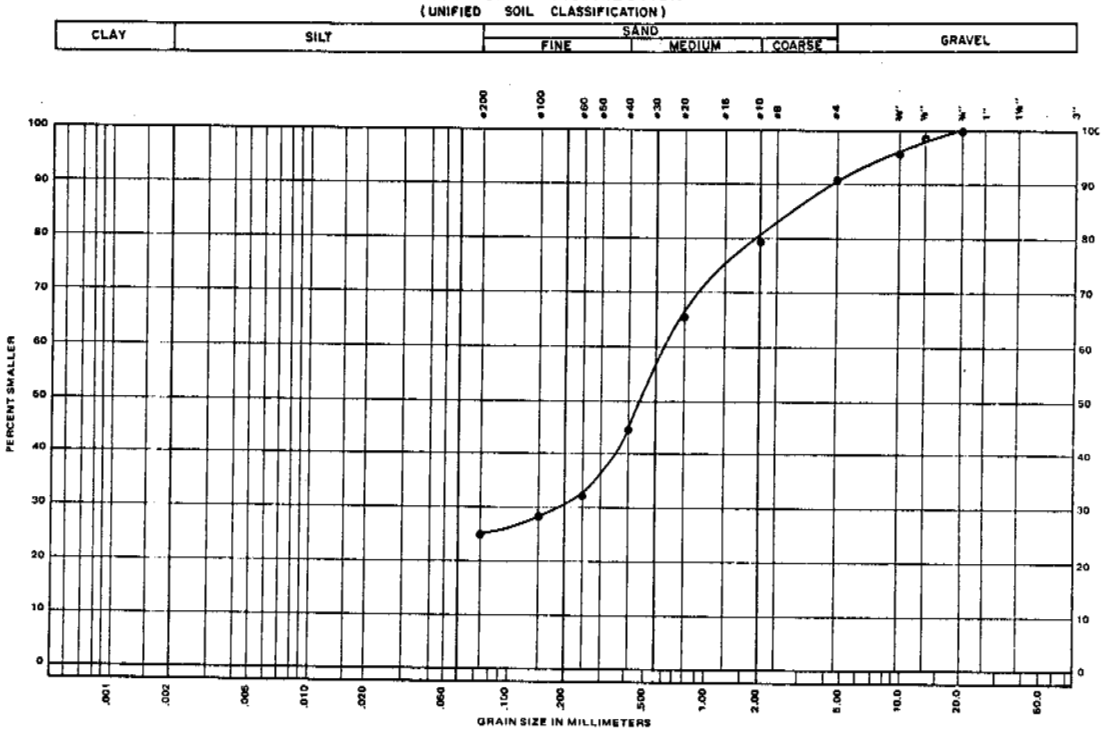
DATE DRILLED: Sep. 22/73 LOGGED BY: EBA 134-1 COMPLETION DEPTH: 26.0'

DRILLING METHOD: AUGER THAW DEPTH: 7.0'

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

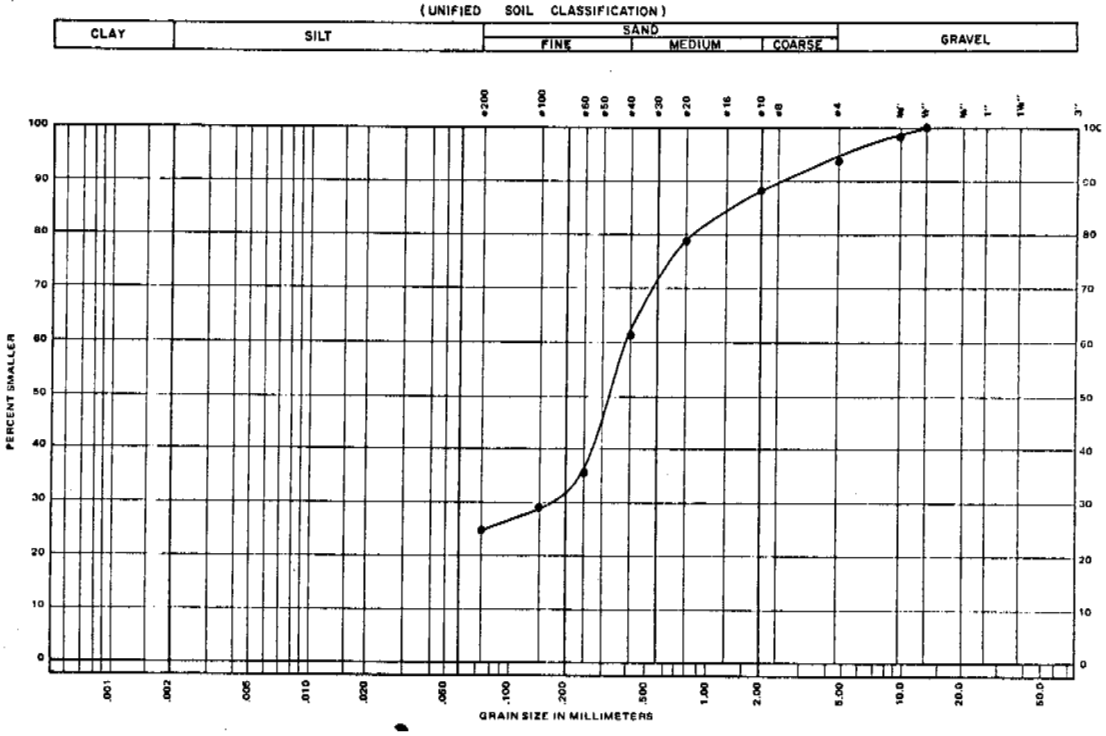


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Silty Sand with a Trace of Gravel (SM) M/C 26.2%

PROJECT Granular Resources
JOB No. E666 DATE December 16/73
SAMPLE No. TP 1136-1
DEPTH 3'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

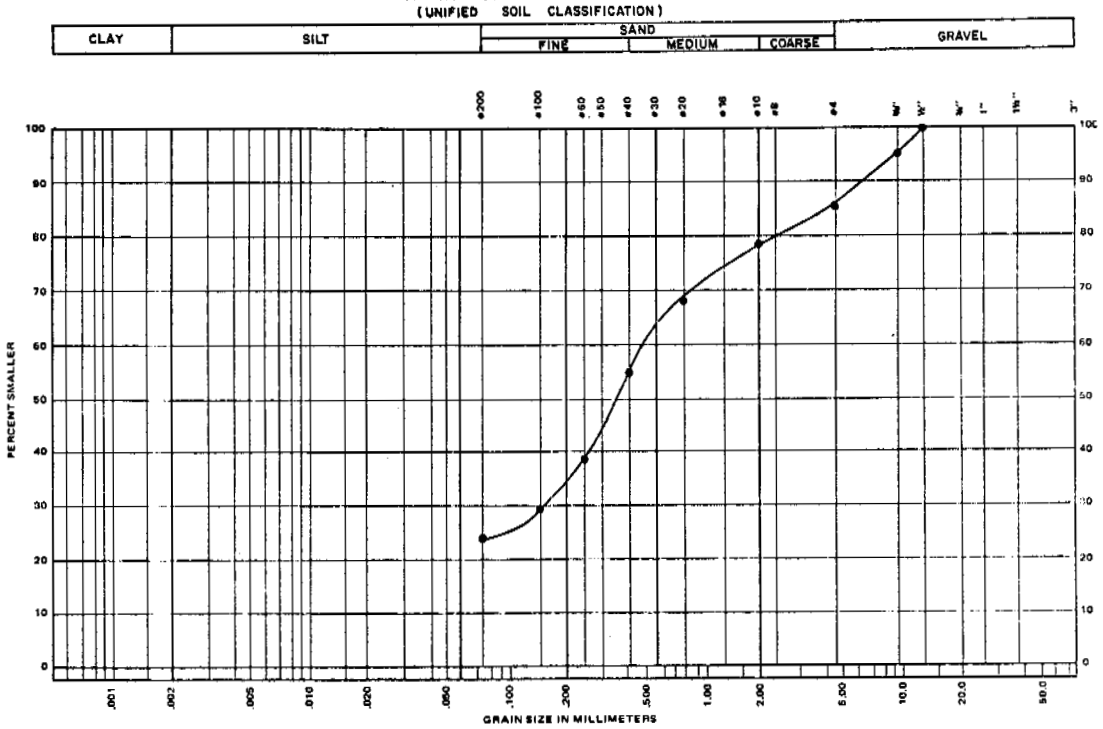


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Sand, Some Silt, Trace of Gravel (SM)

PROJECT Granular Resources
JOB No. E666 DATE February 22/74
SAMPLE No. BH 1136-1
DEPTH 2' - 8'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

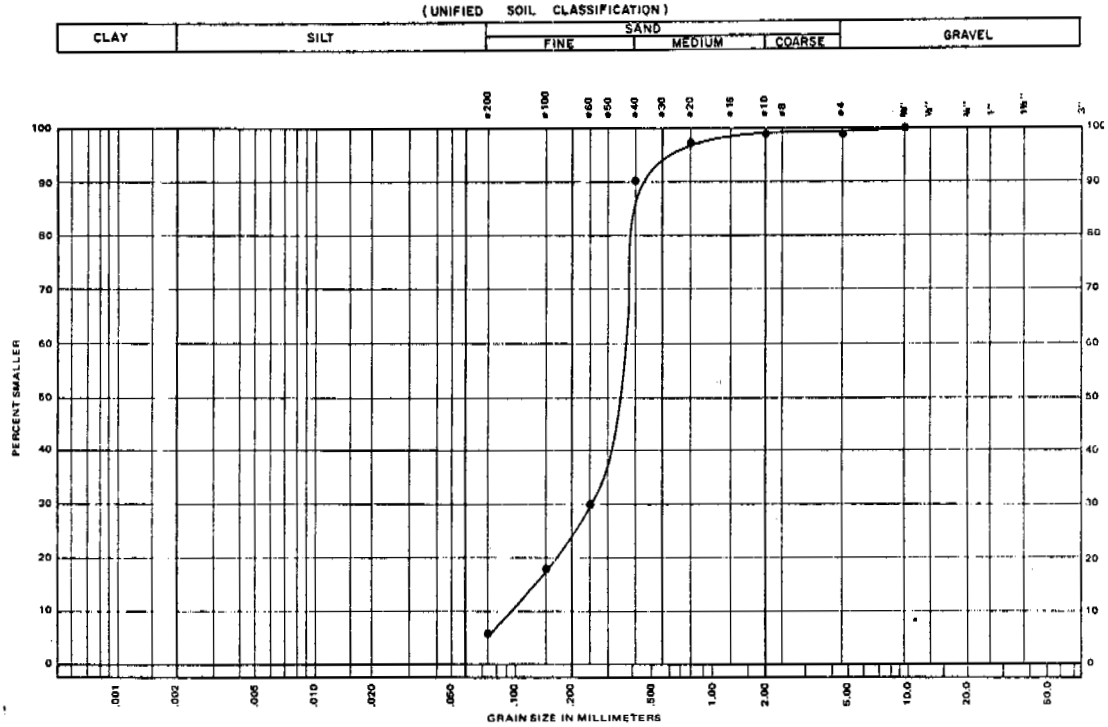


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Sand, Silty, Some Gravel (SM)

PROJECT Granular Resources
JOB No. E666 DATE February 22/74
SAMPLE No. BH 1136-1
DEPTH 10' - 20'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

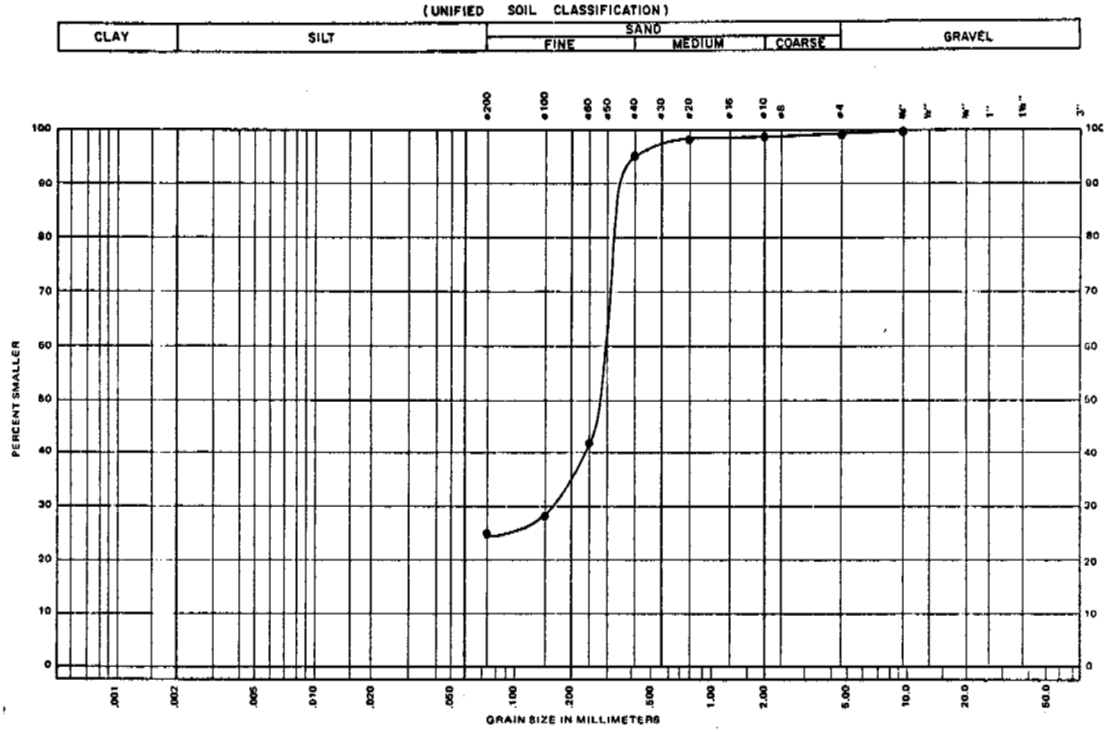


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Sand with a Trace of Silt and Gravel (SP-SM) M/C = 6.5%

PROJECT Granular Resources
JOB No. E666 DATE December 6/73
SAMPLE No. TP 1136-7
DEPTH 4'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

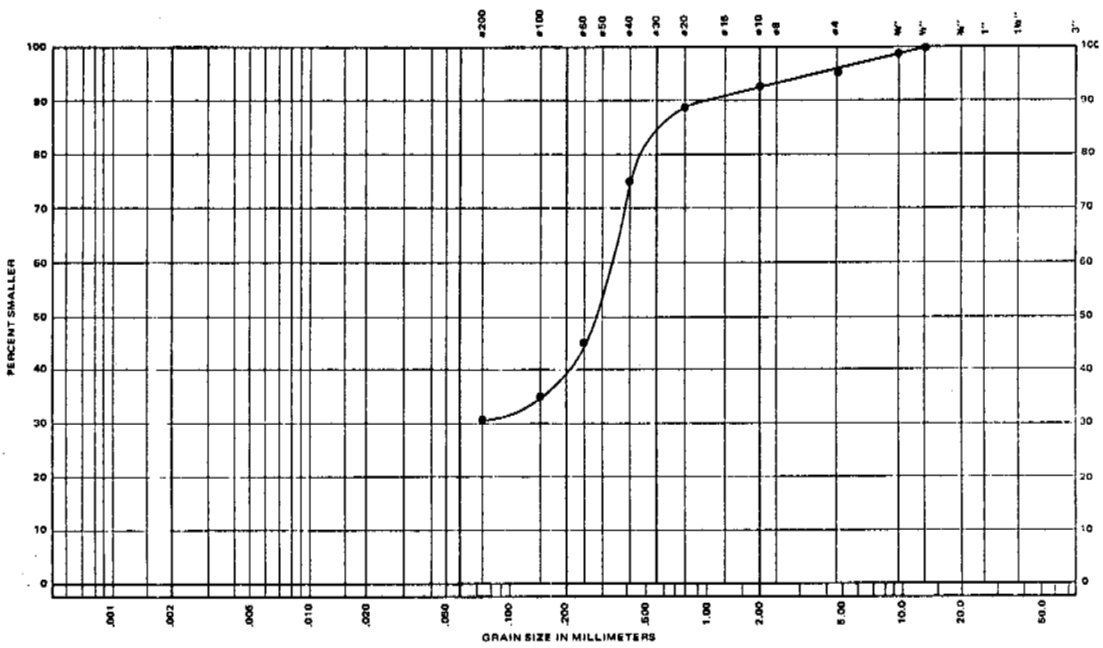


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Silty Sand (SM)

PROJECT Granular Resources
JOB No. E666 DATE February 22/74
SAMPLE No. BH 1136-2
DEPTH 2' - 8'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



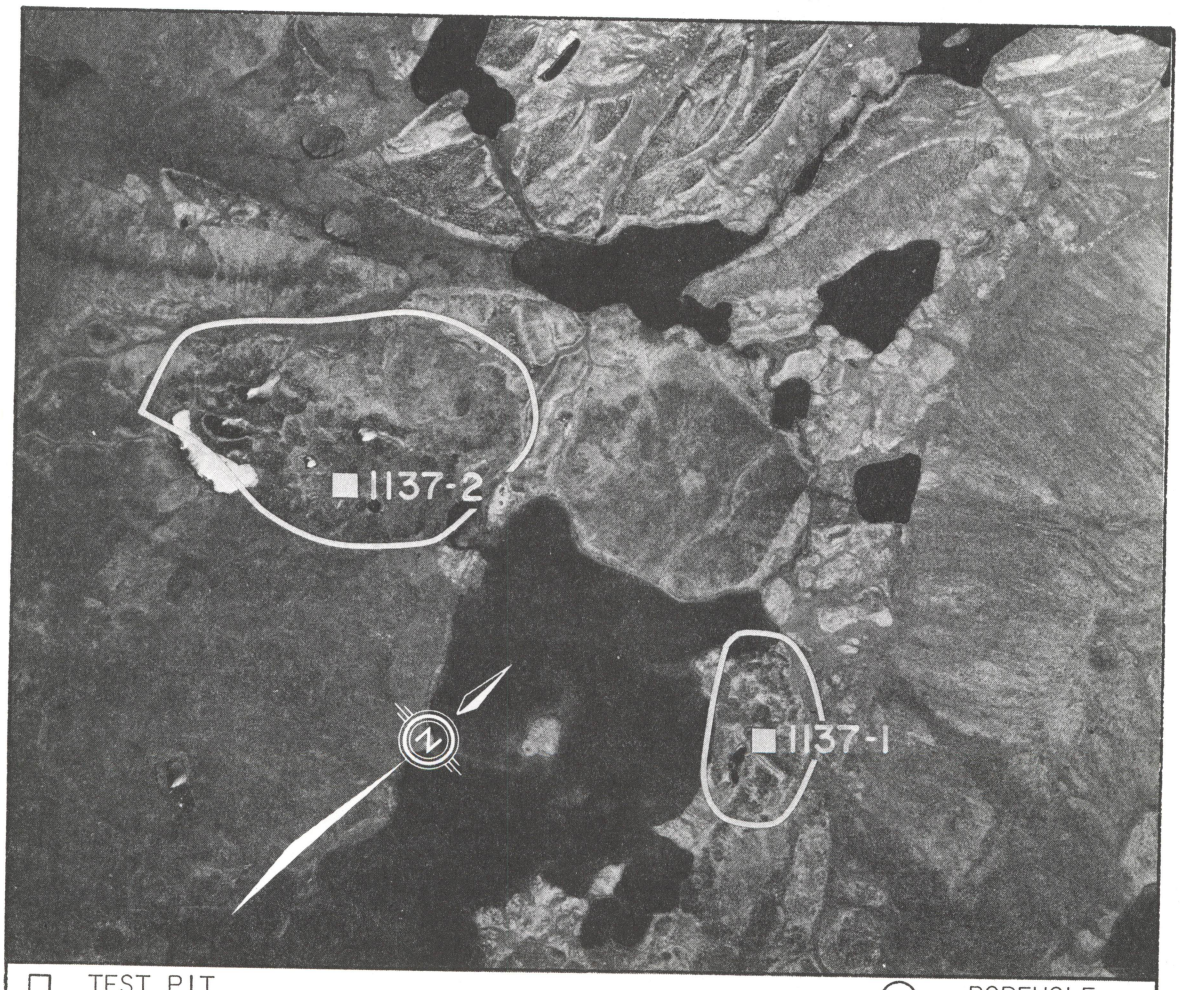
EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Sand and Silt, Trace of Gravel (SM-SC)

PROJECT Granular Resources
JOB No. E666 DATE February 22/74
SAMPLE No. BH 1136-2
DEPTH 10' - 20'

SITE 1137

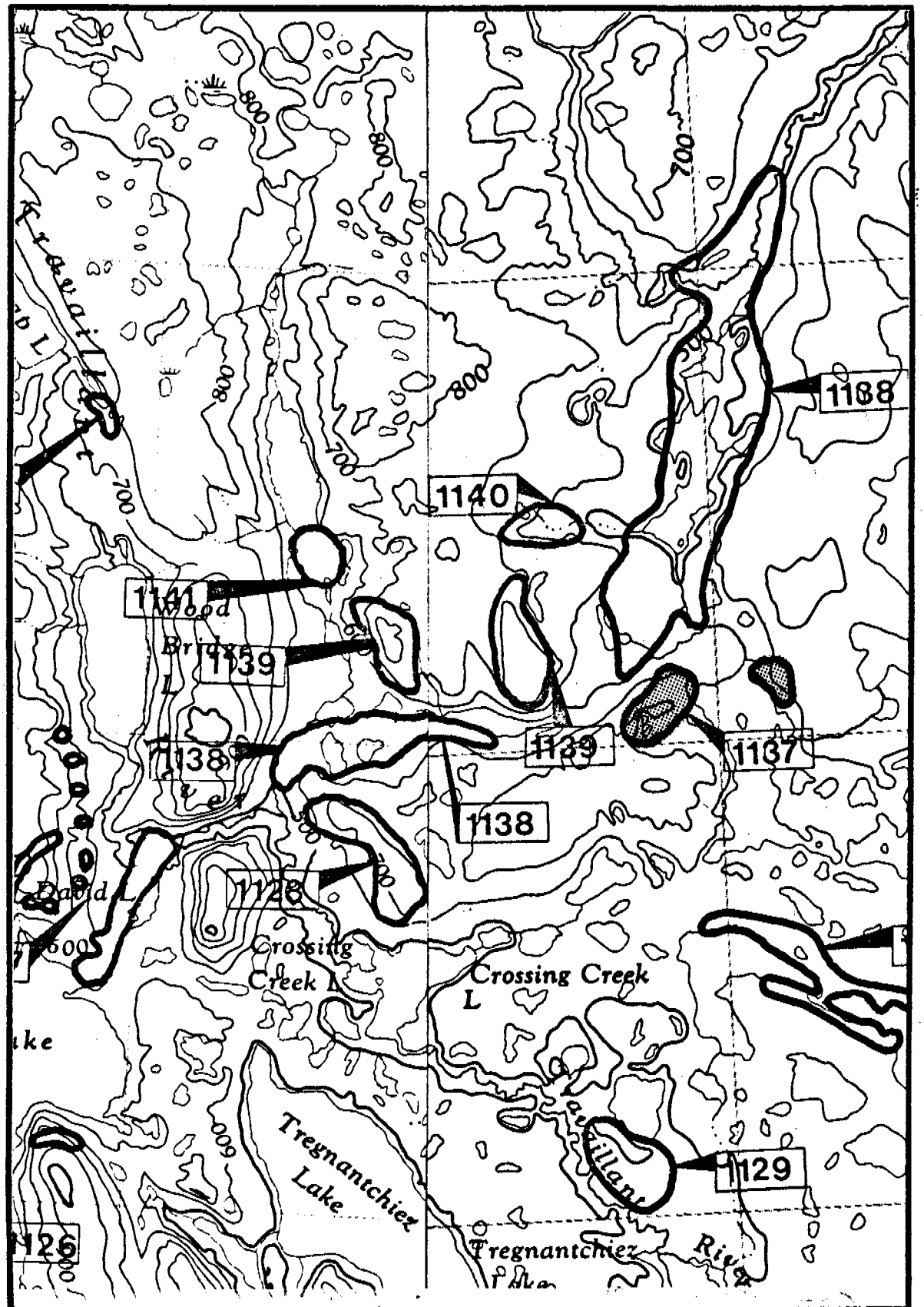
Location:	Site 1137 is situated 9 1/2 miles north of Travaillant Lake. The proposed highway route is 21 miles SE of the site.
Geology:	The material at site 1137 is contained in two small kame complexes. Material is variable from kame to kame.
Material:	Gravel and sand, some silt and clay, poorly graded.
Area:	300 acres.
Drainage:	The site is well drained.



□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A22935-99 SCALE: 1" = 3000' (approx.)

Assessment: The borrow material sampled by the test pitting program at site 1137 is of good quality but is expected to be exhibit considerable variation. The volume of material available is uncertain because of the variation within the material, consequently drilling will be necessary to delimit the deposit. Overburden is thin to negligible but the tree cover of dense spruce will have to be removed. The site has a low environmental sensitivity. Access to the site will be difficult because of thermally sensitive terrain, numerous lakes and hilly ground. Winter operations will be necessary. Haulage distance to proposed construction sites is extremely long. Unless material shortages are critical or the location of construction sites are closer to the site, the feasibility of developing site 1137 is doubtful.



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: TRAVAILLANT LAKE 106-O
ARTIC RED RIVER 106-N

SCALE: 1:125,000

SITE 1137

ENVIRONMENTAL SENSITIVITY INDEX

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	TERRAIN (1) 2 3 4 5 Rating: 5	Formation Stability Ice Content	Flat Land, Terrace, Knoll, Rolling, Outcrop, Ridge, Scarp, Overburden Type & Depth, Wet Site, Dry Site.
5	VEGETATION 1 (2) 3 4 5 Rating: 10	Aesthetic Value Habitat Value	Marsh Black Spruce Muskeg White Spruce Mixed Conifer Conifer - Deciduous Deciduous Dry Slopes Riparian
15	MAMMALS 1 (2) 3 4 5 Rating: 30	Ungulates Furbearers Carnivores Small Mammals	Winter Range, Summer Range, Migration Route, Denning Area, Dams and Lodges, Special Habitat Use.
10	BIRDS 1 (2) 3 4 5 Rating: 20	Waterfowl-Swans, Geese, Ducks Game Birds Raptors Shorebirds Passerine	Migration Pathway, Moulting, Spring Staging, Fall Staging, Nesting-Brooding, Perching, Winter Habitat.
10	FISHERY 1 2 (3) 4 5 Rating: 30	Lakes, Tributaries Mackenzie River: Whitefish Grayling Pike Trout-Perch Lake Trout Burbot Suckers Stickleback Smelt Sculpin Goldeye Chub Dace Walleye Char Cisco	Spawning, Nursery, Feeding, Overwintering. Major Migration Route. Siltation of Spawning Areas, Benthic Communities. Toxic Material Spill. Slumps, Velocity Increments, Migration Barriers. Eutrophication. Blasting.
5	ARCHAEOLOGY (1) 2 3 4 5 Rating: 5	Paleontology Pre-Historic Historic	Probability of Discovery. Low, Medium, High. Known Sites.
10	AESTHETICS (1) 2 3 4 5 Rating: 10	Visible from: Physical Disturbance	River, Highway, Air. Dust, Waste, Stockpiles, Noises.
15	RESOURCE UTILIZATION 1 (2) 3 4 5 Rating: 30	Fort Good Hope Arctic Red R. Inuvik	Improved Access. Traplines. Hunting. Fishing. Domestic. Commercial.
15	ASSOCIATED DISTURBANCES 1 2 3 4 (5) Rating: 75	Access Roads Miles From Highway Miles From Pipeline Hydrologic Alterations Continued Use For Maintenance.	0-2, 2-5, 5-10, 10+ 0-2, 2-5, 5-10, 10+ Cuts and Fills. Creek Crossings. Compaction. Slumping, Erosion. Stockpiles, Waste, Dust.
10	RESTORATION (1) 2 3 4 5 Rating: 10	Soil Stabilization Visual Improvement Habitat Replacement	Natural Regeneration. Grass-Legume Seeding. Transplants. Sustained Maintenance. Erosion Control Systems.

R.I.R. - Relative Importance Units - Base of 100 units.

NOTE: SENSITIVITY INDEX RANGE

MINIMAL SENSITIVITY		MAXIMUM SENSITIVITY
100	TO	500

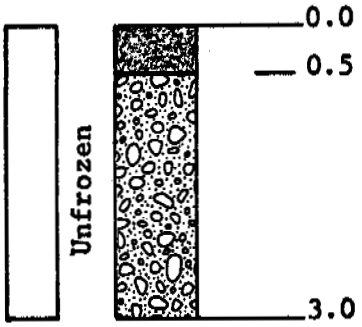
TOTAL INDEX: 225

SPECIAL CONCERNS: Straddles creek drainage. Aquatic habitats should be maintained.

F.F. SLANEY & COMPANY LIMITED
VANCOUVER, B. C.

TEST PIT LOG

TP 1137-1

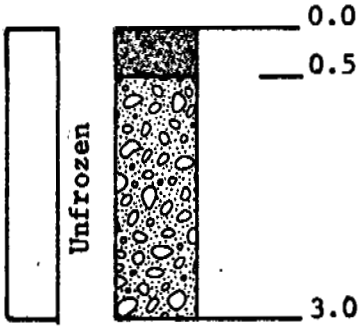


Moss

Gravel, dark grey
moist
loose

38% GRAVEL
55% SAND
7% SILT & CLAY

TP 1137-2

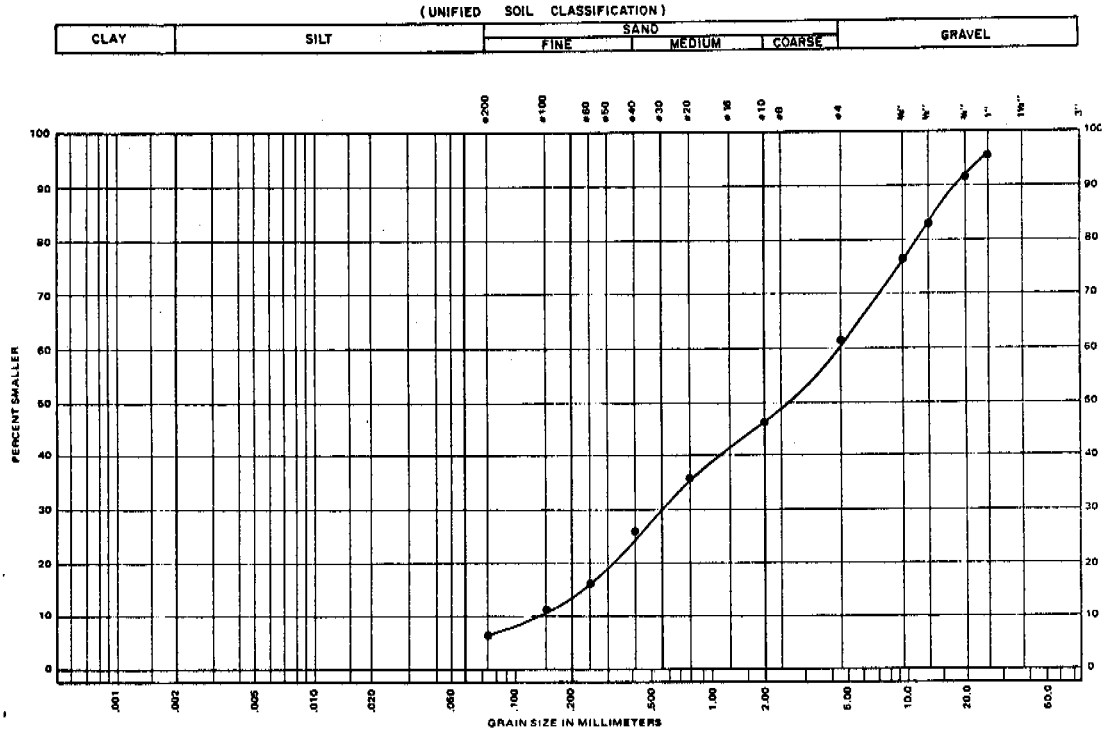


Moss

Gravel, light brown
moist
well graded

4% GRAVEL
95% SAND
1% SILT & CLAY

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

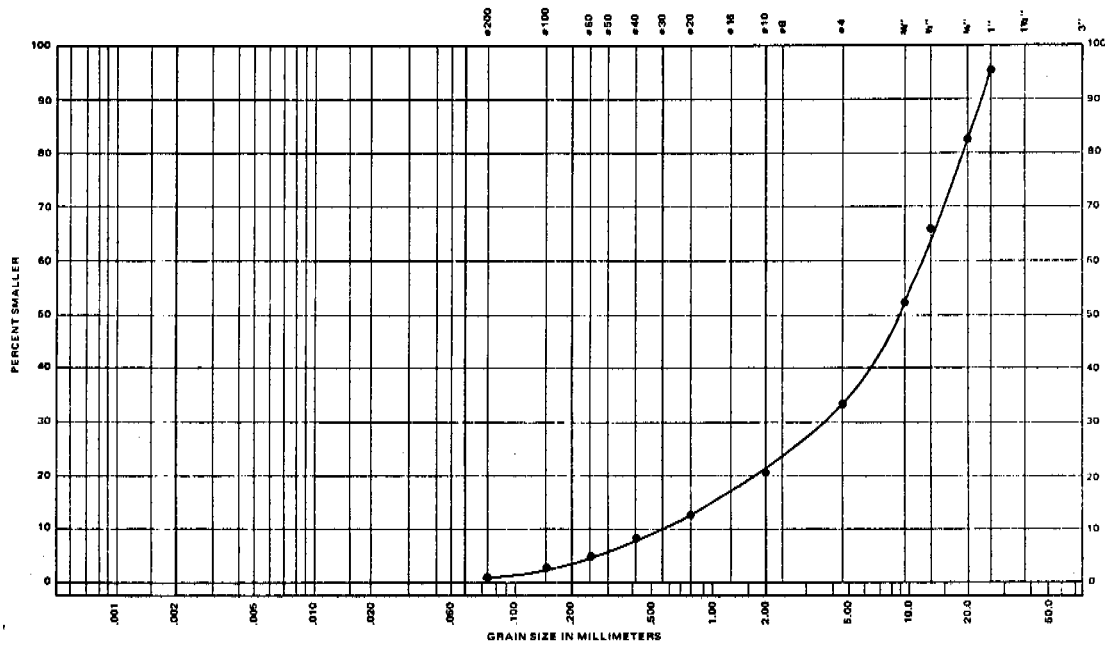


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Sand and Gravel With A Trace of Silt(GW-GM) M/C = 8.9%

PROJECT Granular Resources
JOB No. E-666 DATE Nov. 29/73
SAMPLE No. TP 1137-1
DEPTH 3'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Gravel and Sand With A Trace of Silt (GW) M/C = 5.4%

PROJECT Granular Resources
JOB No. E-666 DATE Nov. 29/73
SAMPLE No. TP 1137-2
DEPTH 3'

SITE 1138

location: Site 1138 is approximately 7 miles long and is situated 11 miles north of Travaillant Lake. The proposed pipeline and highway routes are roughly 22 miles south of the site.

Geology: Site 1138 is a thick, extensive outwash deposit which has been dissected by old stream channels.

Material: Variable from sand to gravel with trace to some silt, generally well graded.

Volume: 35,000,000 cu. yd. estimate may be conservative.

Area: 1700 acres.

Drainage: The upland regions within the site are well drained to the nearby chain of lakes.

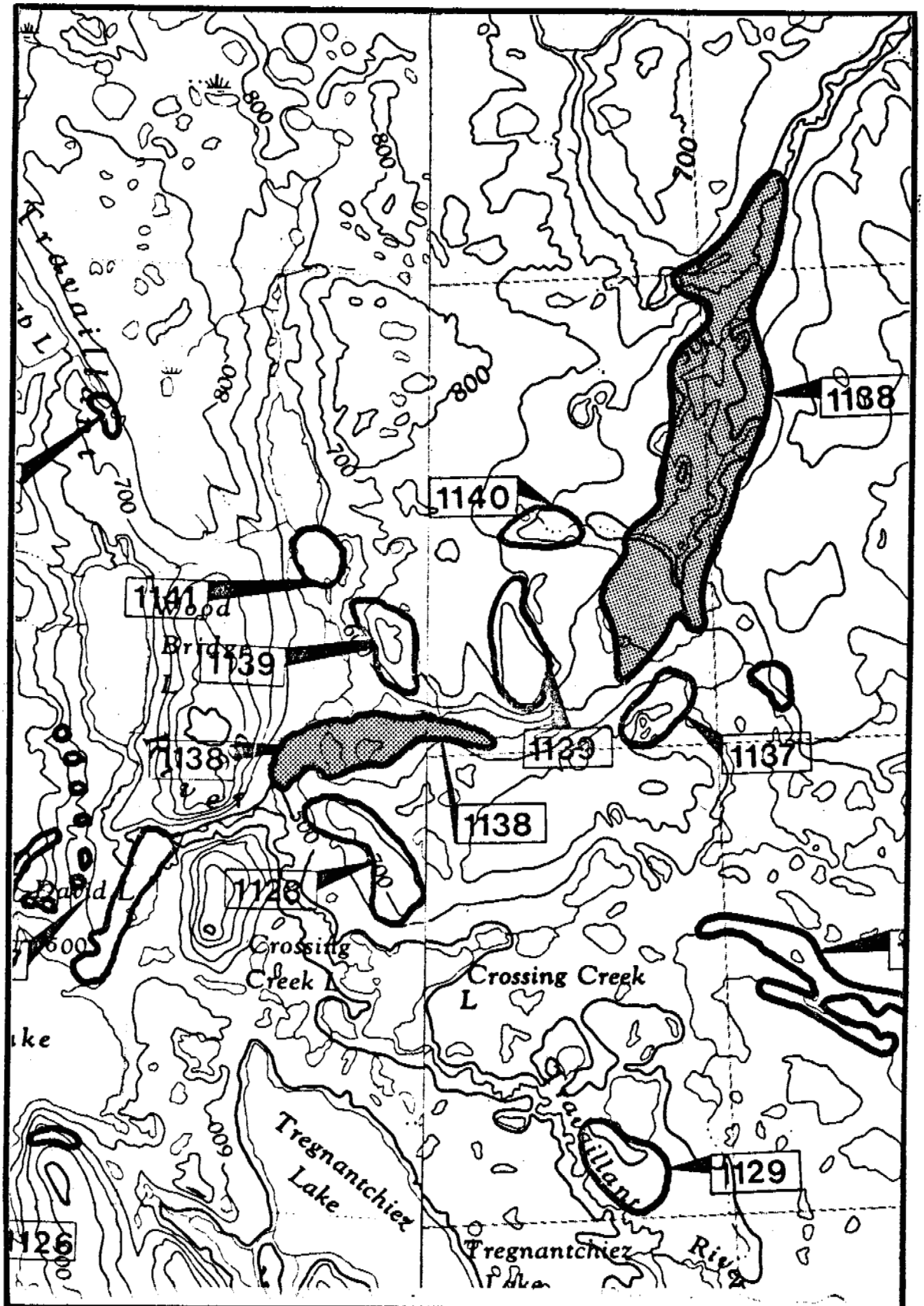
Assessment: Site 1138 contains a very large volume of good and fair quality borrow material. Granular material suitable for processing into concrete aggregate is available at the site. Processing requirements will include screening the fraction above the 1/4 inch seive, washing it and then crushing part of it to obtain a sand fraction. Moisture contents of the soil are low but permafrost was encountered at a depth of 8 1/2 feet. Frozen gravel will have to be blasted prior to excavation. Overburden varies from a few inches of moss to a few feet of peat and silt which will have to be stripped and stockpiled for use in restoration. Vegetative cover is variable from sparse to dense and where necessary will have to be removed. The site has been assessed a high environmental sensitivity rating. Access to the site is rather difficult because of hilly and thermally sensitive terrain and numerous lakes. Haulage distance to proposed highway and pipeline routes would be very long. Unless material shortages are critical or the location of construction sites is altered such that they are closer to site 1138, it is very doubtful whether it is feasible to develop the site.

□ TEST PIT

○ BOREHOLE

AIRPHOTO Nos. A22935-100, A22935-31, A22935-201

SCALE: 1" = 3000' (approx.)



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: TRAVAILLANT LAKE 106-O
ARTIC RED RIVER 106-N

SCALE: 1:125,000

SITE 1138

ENVIRONMENTAL SENSITIVITY INDEX

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	TERRAIN 1 2 3 (4) 5 Rating: 20	Formation Stability Ice Content	Flat Land, Terrace, Knoll, Rolling, Outcrop, Ridge, Scarp, Overburden Type & Depth, Wet Site, Dry Site.
5	VEGETATION 1 2 (3) 4 5 Rating: 15	Aesthetic Value Habitat Value	Marsh Black Spruce Muskeg White Spruce Mixed Conifer Conifer - Deciduous Deciduous Dry Slopes Riparian
15	MAMMALS 1 2 3 4 (5) Rating: 75	Ungulates Furbearers Carnivores Small Mammals	Winter Range, Summer Range, Migration Route, Denning Area, Dams and Lodges, Special Habitat Use.
10	BIRDS 1 2 (3) 4 5 Rating: 30	Waterfowl-Swans, Geese, Ducks Game Birds Raptors Shorebirds Passerine	Migration Pathway, Moulting, Spring Staging, Fall Staging, Nesting-Brooding, Perching, Winter Habitat.
10	FISHERY 1 2 (3) 4 5 Rating: 30	Lakes, Tributaries Mackenzie River: Whitefish / Smelt Grayling / Sculpin Pike / Goldeye Trout-Perch / Chub Lake Trout / Dace Burbot / Walleye Suckers / Char Stickleback / Cisco	Spawning, Nursery, Feeding, Overwintering. Major Migration Route. Siltation of Spawning Areas, Benthic Communities. Toxic Material Spill. Slumps, Velocity Increments, Migration Barriers. Eutrophication. Blasting.
5	ARCHAEOLOGY 1 2 (3) 4 5 Rating: 15	Paleontology Pre-Historic Historic	Probability of Discovery. Low, Medium, High. Known Sites.
10	AESTHETICS 1 (2) 3 4 5 Rating: 20	Visible from: Physical Disturbance	River, Highway, Air. Dust, Waste, Stockpiles. Noises.
15	RESOURCE UTILIZATION 1 2 (3) 4 5 Rating: 45	Fort Good Hope Arctic Red R. Inuvik	Improved Access. Traplines. Hunting. Fishing. Domestic. Commercial.
15	ASSOCIATED DISTURBANCES 1 2 3 4 (5) Rating: 75	Access Roads Miles From Highway Miles From Pipeline Hydrologic Alterations Continued Use For Maintenance.	0-2, 2-5, 5-10, 10+ 0-2, 2-5, 5-10, 10+ Cuts and Fills. Creek Crossings. Compaction. Slumping, Erosion. Stockpiles. Waste, Dust.
10	RESTORATION 1 2 (3) 4 5 Rating: 30	Soil Stabilization Visual Improvement Habitat Replacement	Natural Regeneration. Grass-Legume Seeding. Transplants. Sustained Maintenance. Erosion Control Systems.

R.I.R. - Relative Importance Units - Base of 100 units.

NOTE: SENSITIVITY INDEX RANGE

MINIMAL SENSITIVITY		MAXIMUM SENSITIVITY
100	TO	500

TOTAL INDEX: 355

SPECIAL CONCERNS: Surrounds a series of lakes. Within Barren-Ground Caribou winter range. Denning areas for fox, wolf, bear. Habitat maintenance suggested through seasonal operations and pit design for habitat provision.

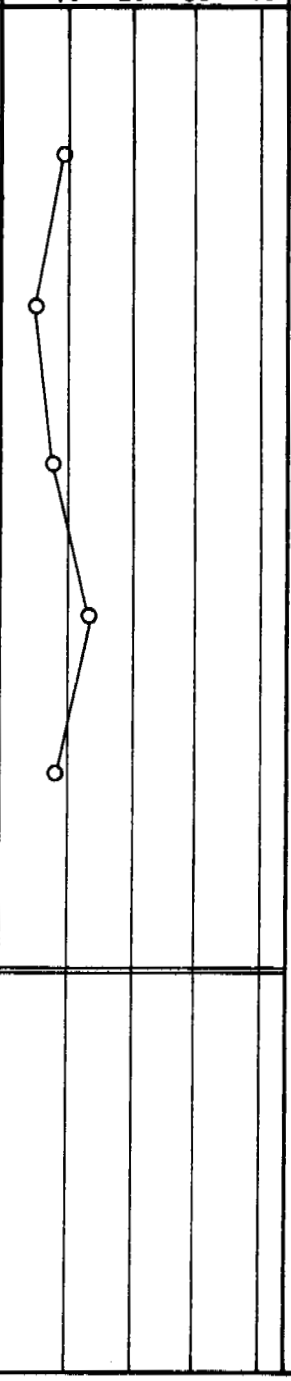
F.F. SLANEY & COMPANY LIMITED
VANCOUVER, B. C.

GRANULAR MATERIALS INVENTORY - STAGE III

SITE NO. 1138 HOLE NO. 4 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION
	Pt	PEAT-silty, dry, dark brown	NOT FROZEN
1	GW-GM	GRAVEL & SAND -sandy, some silt, odd cobbles, well graded, maximum 1" average ½", subangular to subrounded, dry, light brown.	
2			
3			
4		(2' - 10') 58% GRAVEL 31% SAND 11% SILT & CLAY	
5			
6		-gravel subangular to angular ½" - 3/4", maximum 2", sand quite coarse.	
7			
8		-silty, fine to medium grained, brown, very wet	FROZEN
9		-average ½" -3/4", maximum 2", subangular to angular.	
10			
11			
12			
13		END OF HOLE	
14			
15			
16			
17			

MOISTURE CONTENT %



DATE DRILLED: Sep. 12/73

LOGGED BY: EBA 111-5

COMPLETION DEPTH: 12.5'

DRILLING METHOD: AUGER & CONVENTIONAL AIR

THAW DEPTH: 8.0'

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1138 HOLE NO. 6 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
	Pt	PEAT & SAND	NOT FROZEN		
1	GM	GRAVEL -very silty, sandy, subangular, average ½", some cobbles from ½' to 1½", dry light brown.			1
2					2
3		31% GRAVEL 44% SAND 25% SILT & CLAY (2' - 10')			3
4		5.7% O. C.			4
5					5
6		-silty, trace of clay, sand medium to coarse grained, gravel fine, slight plasticity, light brown			6
7					7
8					8
9			FROZEN		9
10		-silty, some clay, sand -predominantly coarse, some fine to medium grained wet, light ot medium brown			10
11					11
12					12
13		END OF HOLE			13
14					14
15					15
16					16
17					17

DATE DRILLED: Sep. 12/73

LOGGED BY: EBA 111-7

COMPLETION DEPTH: 12.0'

DRILLING METHOD: AUGER

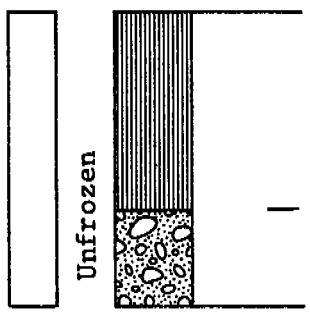
THAW DEPTH: 8.5'

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

TEST PIT LOG

TP 1138-1

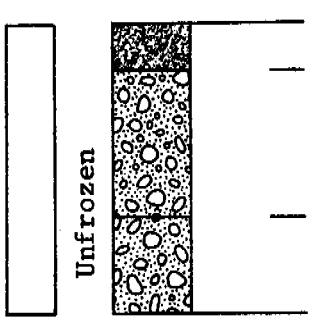


Silt, medium brown
some organic rootlets

Gravel, brown, silty,
well graded

49% GRAVEL
43% SAND
8% SILT & CLAY

TP 1138-3



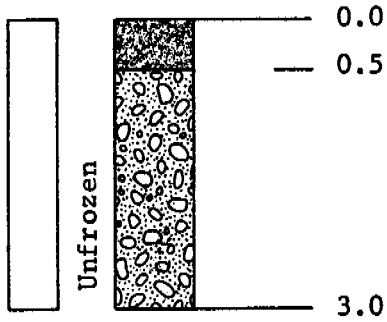
Moss

Gravel, sandy
wet

Gravel, clayey

39% GRAVEL
40% SAND
21% SILT & CLAY

TP 1138-4



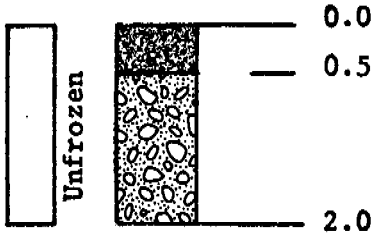
Moss

Gravel, well graded
moist

65% GRAVEL
32% SAND
3% SILT & CLAY

TEST PIT LOG

TP 1138-5

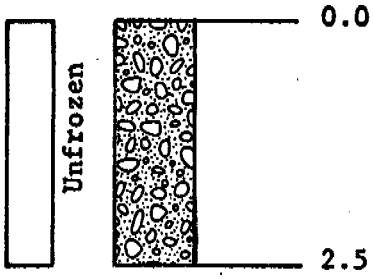


Moss

Gravel, silty
dry
loose

35% GRAVEL
43% SAND
22% SILT & CLAY

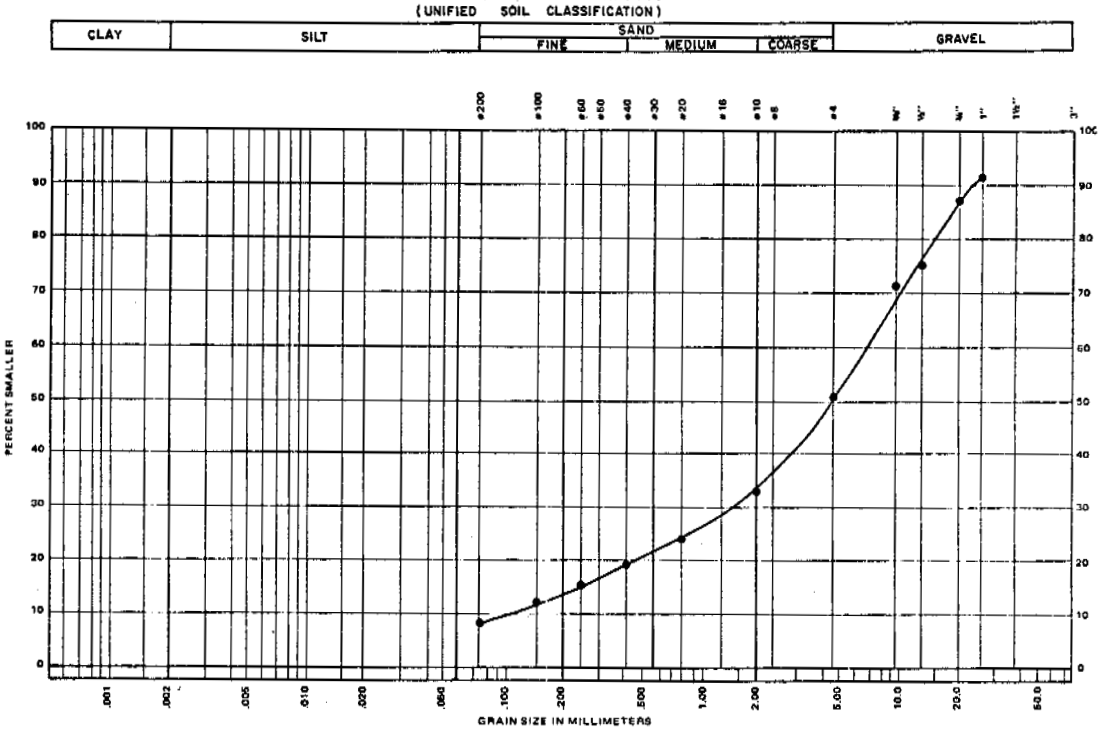
TP 1138-6



Gravel, well graded
moist
some organics

60% GRAVEL
36% SAND
4% SILT & CLAY

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

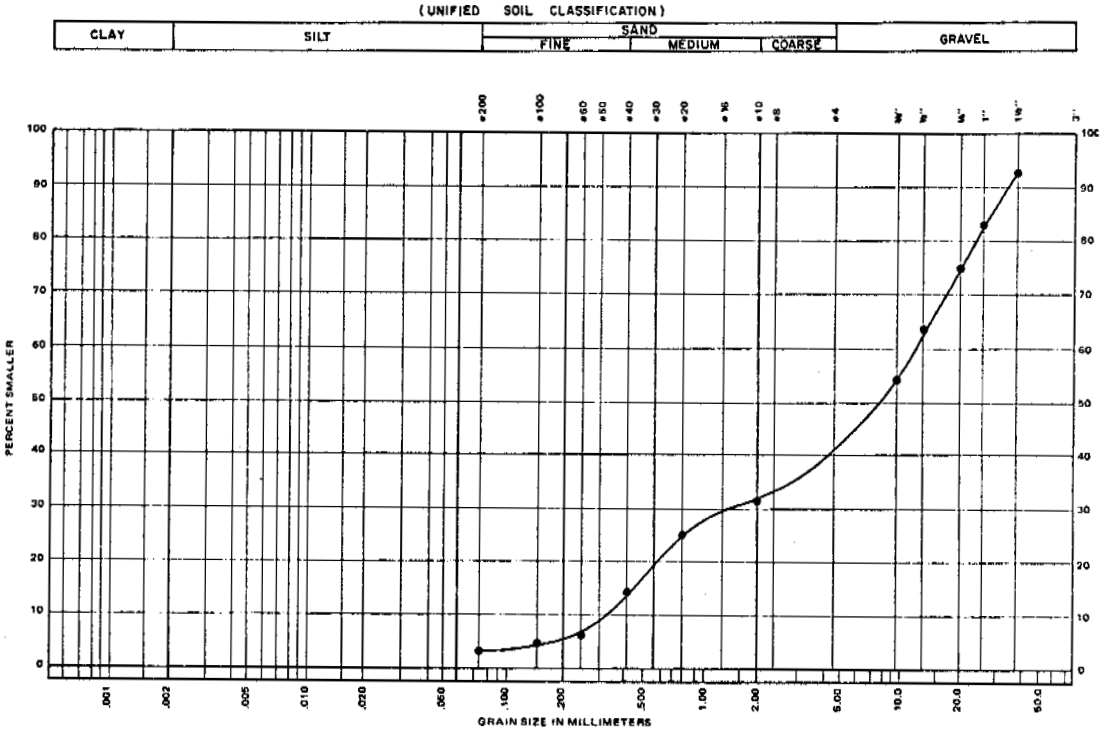


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Gravel and Sand With Trace of Silt (GW-GM) M/C = 4.1%

PROJECT Granular Resources
JOB No. E-666 DATE Nov. 29/73
SAMPLE No. TP 1138-1
DEPTH 3'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

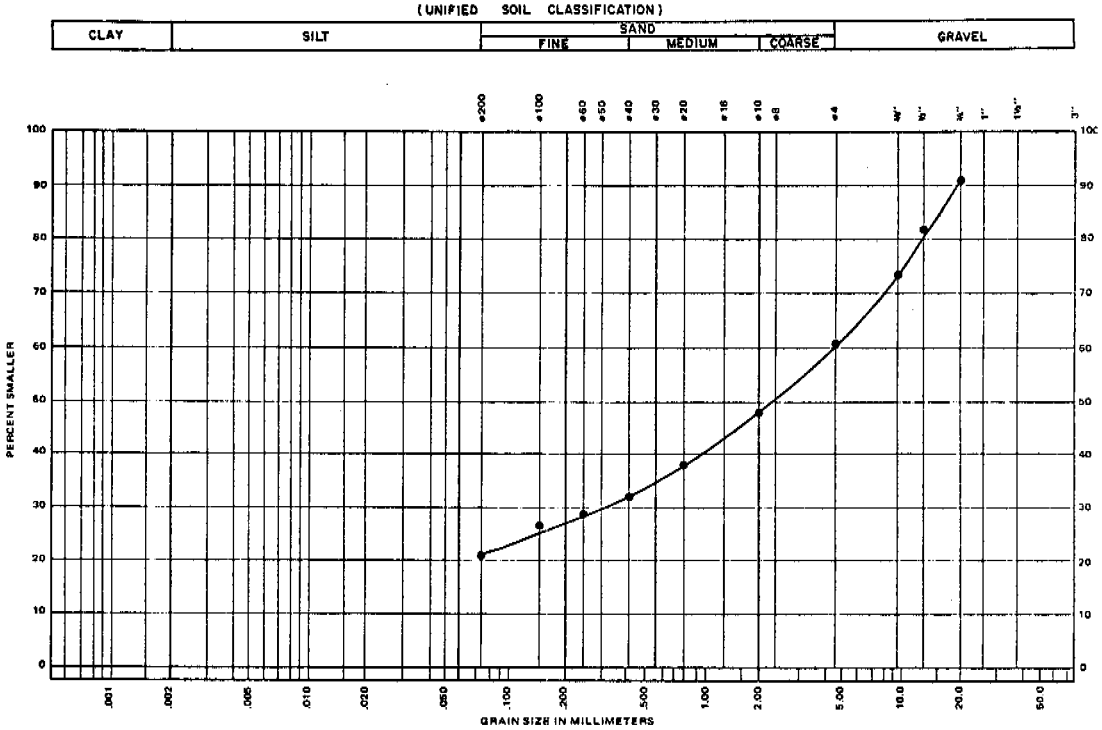


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Gravel and Sand With Trace of Silt (GP), M/C = 8.09 - 11.1%

PROJECT Granular Resources
JOB No. E-666 DATE Nov. 29/73
SAMPLE No. TP 1138-2
DEPTH surface

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

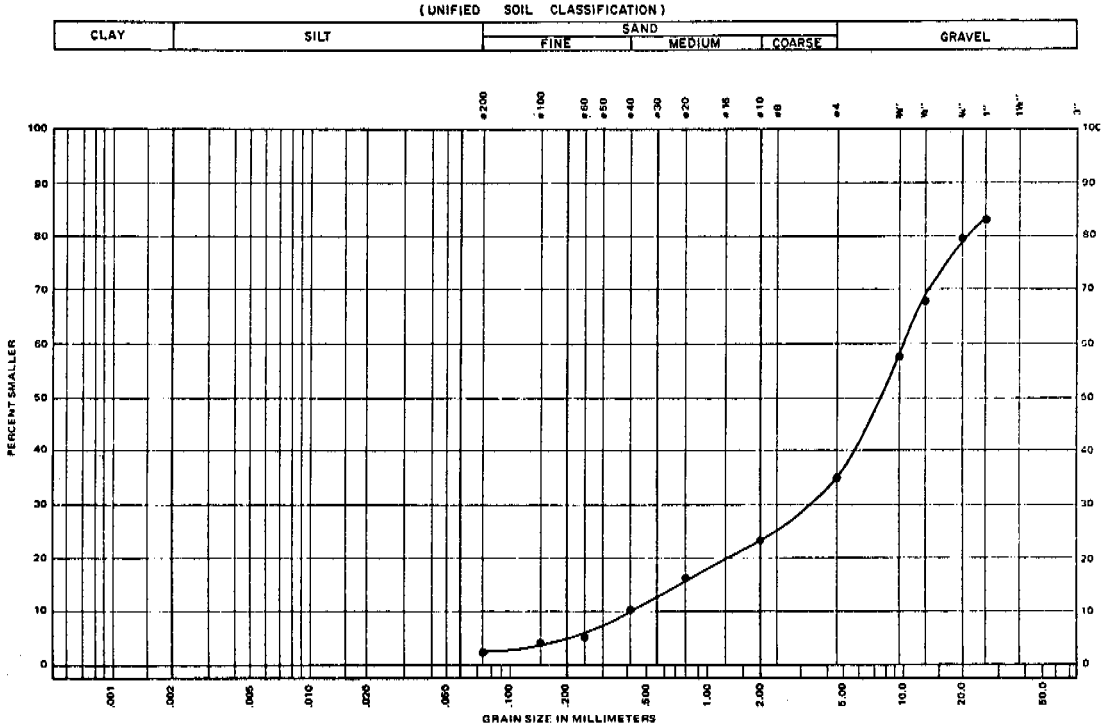


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Sand and Gravel, Silty (GM) M/C = 12.2%

PROJECT Granular Resources
JOB No. E-666 DATE Nov. 30/73
SAMPLE No. TP 1138-3
DEPTH 2'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

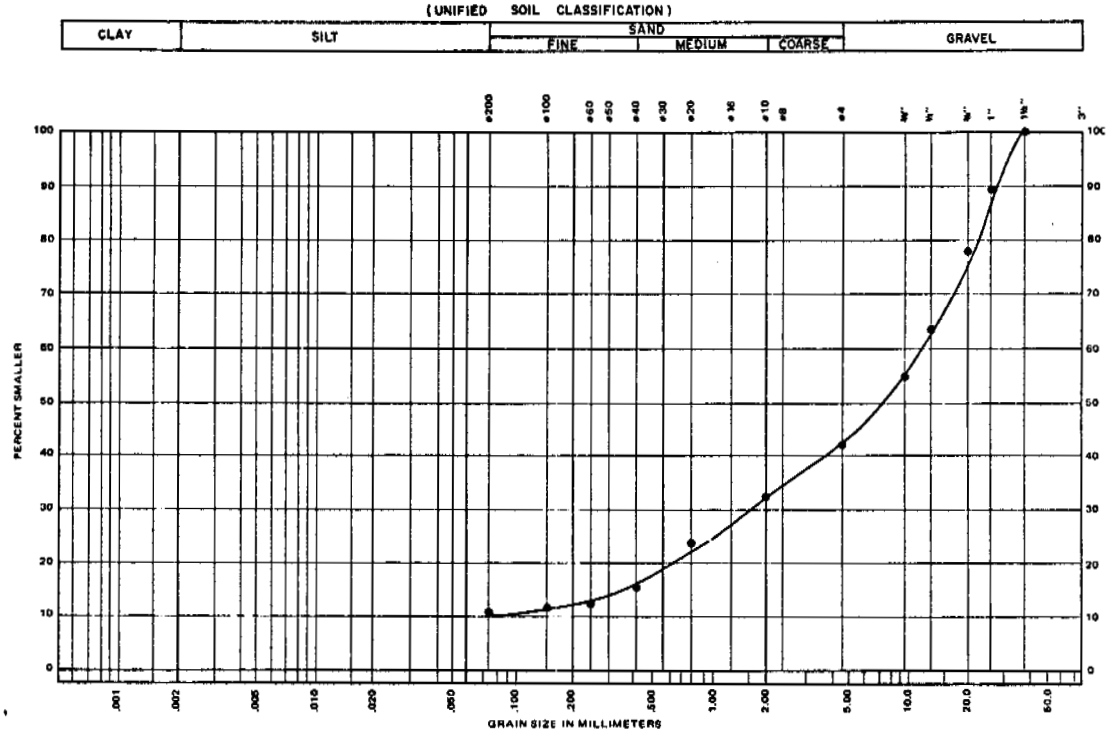


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Gravel and Sand With A Trace of Silt (GW) M/C = 4.5%

PROJECT Granular Resources
JOB No. E-666 DATE Nov. 29/73
SAMPLE No. TP 1138-4
DEPTH 3'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

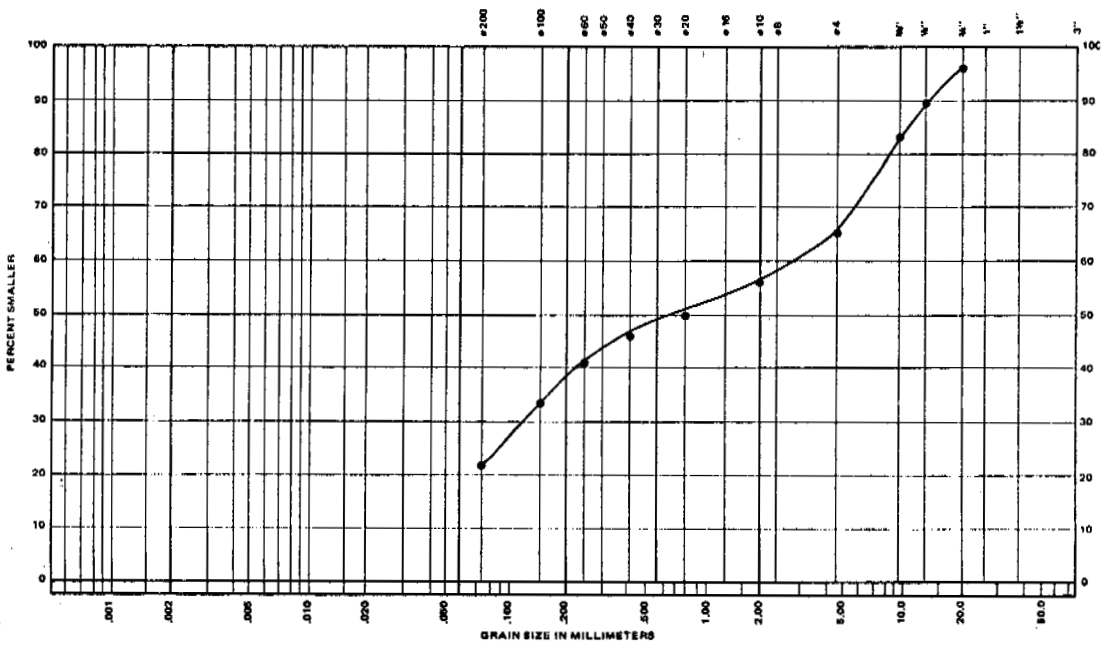


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Gravel and Sand and Some Silt (GW-GM)

PROJECT Granular Resources
JOB No. E-666 DATE
SAMPLE No. BH 1138-4
DEPTH 2' - 10'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

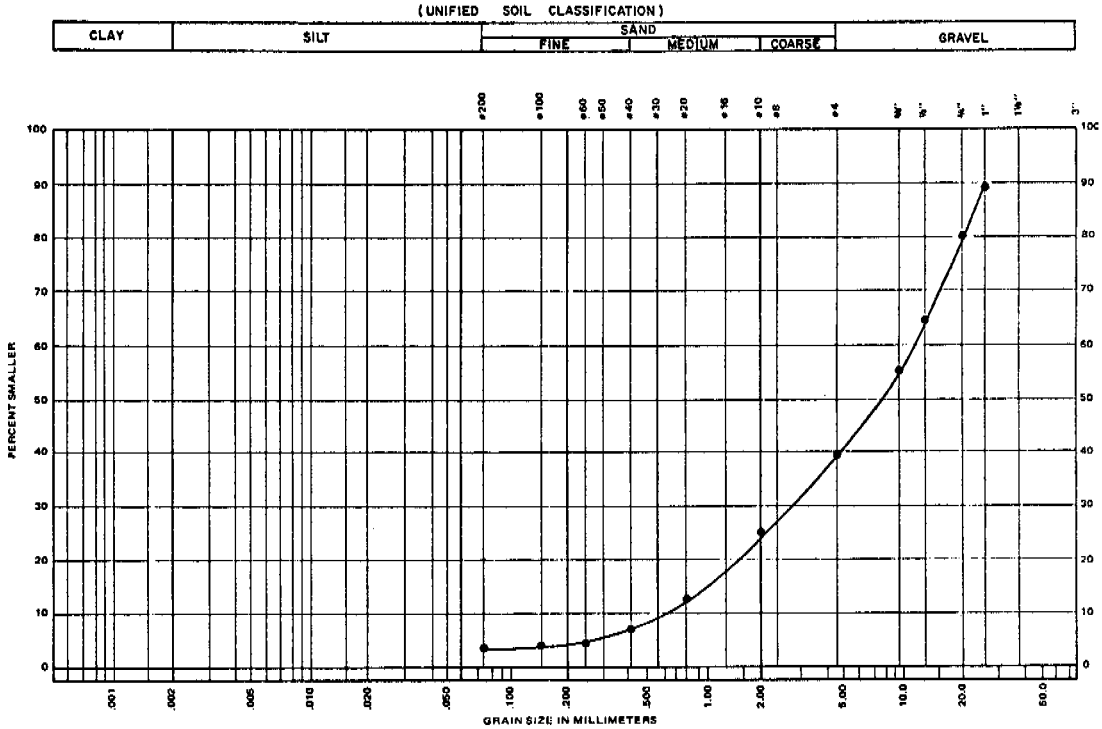


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Sand and Gravel Silty (GM) M/C = 8.9%

PROJECT Granular Resources
JOB No. E-666 DATE Nov. 29/73
SAMPLE No. TP 1138-5
DEPTH 2'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

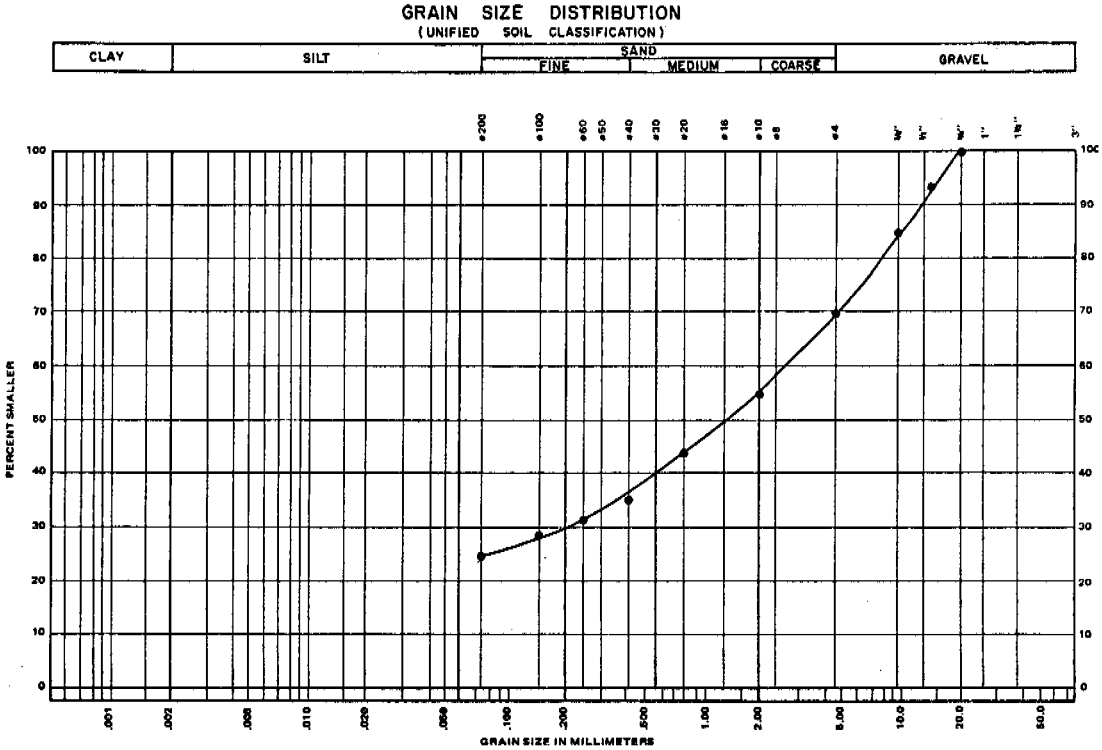


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Gravel and Sand with A Trace of Silt (GW) H/C = 6.4%

PROJECT Granular Resources
JOB No. E-666 DATE Nov. 29/73
SAMPLE No. TP 1138-6
DEPTH 3'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Sand and Gravel Silty (SM)

PROJECT Granular Resources
JOB No. E-666 DATE Jan. 28/74
SAMPLE No. BH 1138-6
DEPTH 2' - 10'

PETROGRAPHIC ANALYSIS

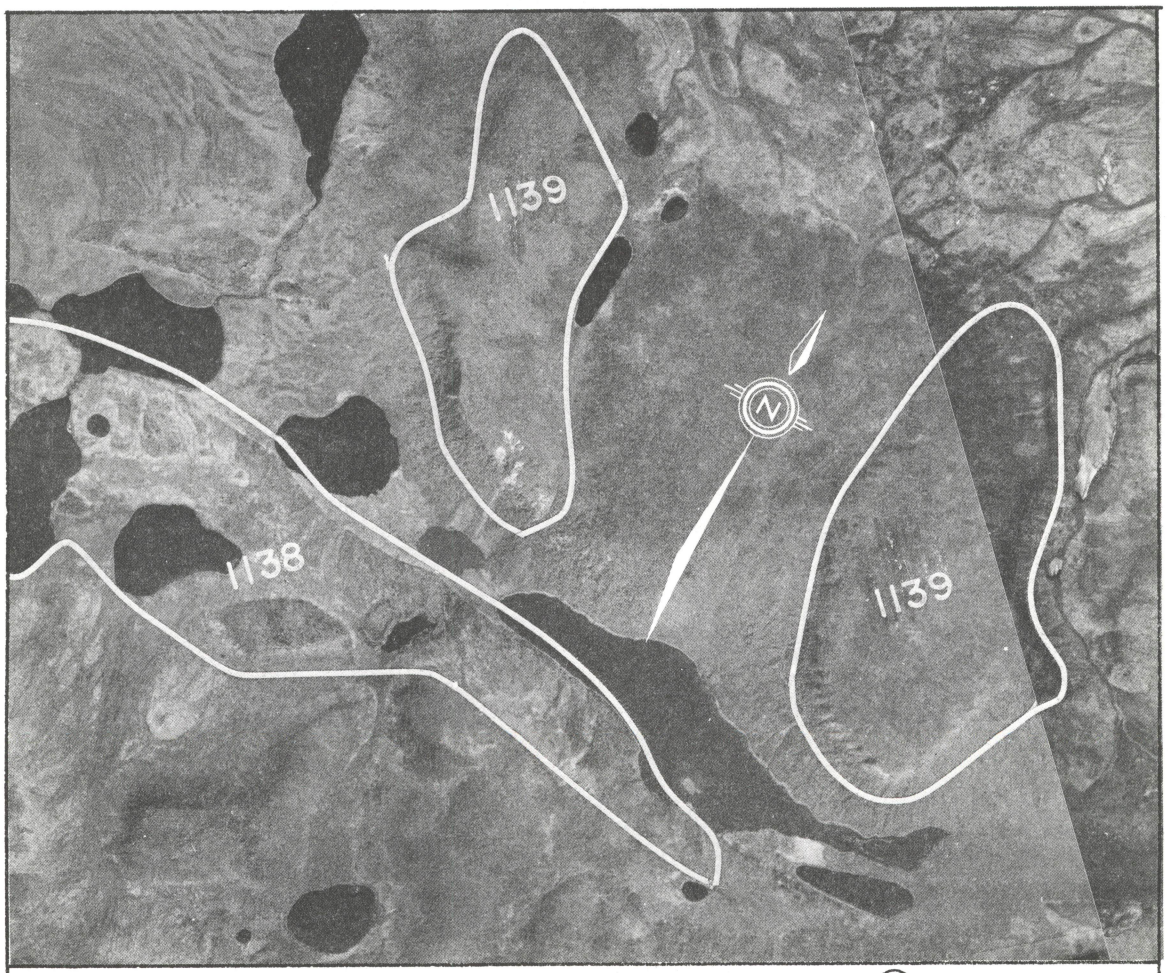
Sandstone (fissile)	98%
Quartzite	2%

SITE 1139a

Location: Site 1139 is 4 miles north of Crossing Creek Lake. The proposed highway route is 21 miles south of the site.

Material: Shale.

Assessment: Site 1139 was interpreted from aerial photographs as a bedrock (shale) outcrop but was not investigated in the field. Overburden thickness is thought to be considerable and haulage distance to proposed construction sites is very long. Access to the site is rather difficult

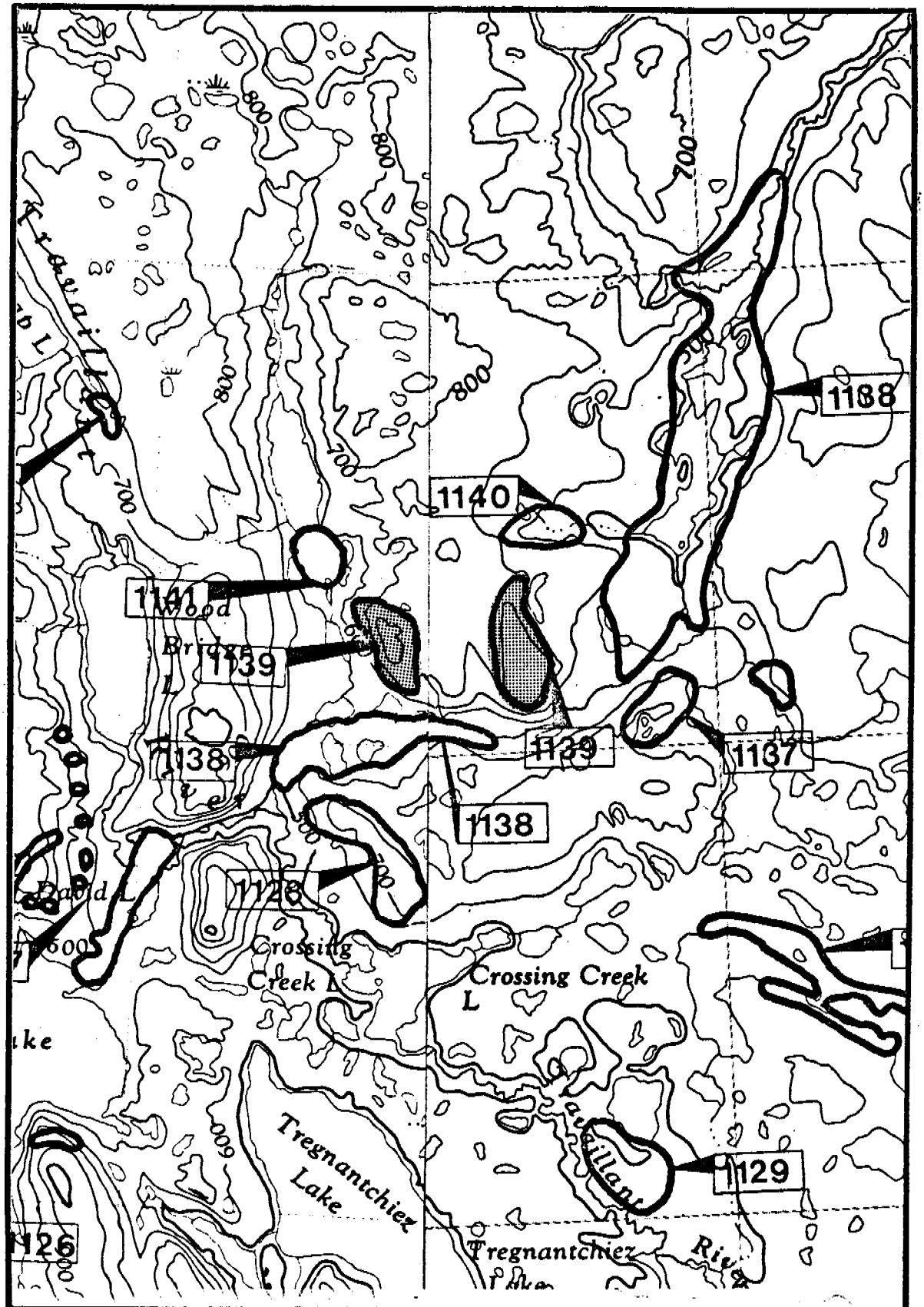


□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A22935-201
A22935-100

SCALE: 1" = 3000' (approx.)

because of hilly, thermally sensitive terrain and numerous lakes. Winter operations would be necessary. Since an extremely large volume of good quality sand and gravel borrow is situated within a mile of site 1139, it is not recommended for further follow-up or development.



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: TRAVAILLANT LAKE 106-O
ARTIC RED RIVER 106-N

SCALE: 1:125,000

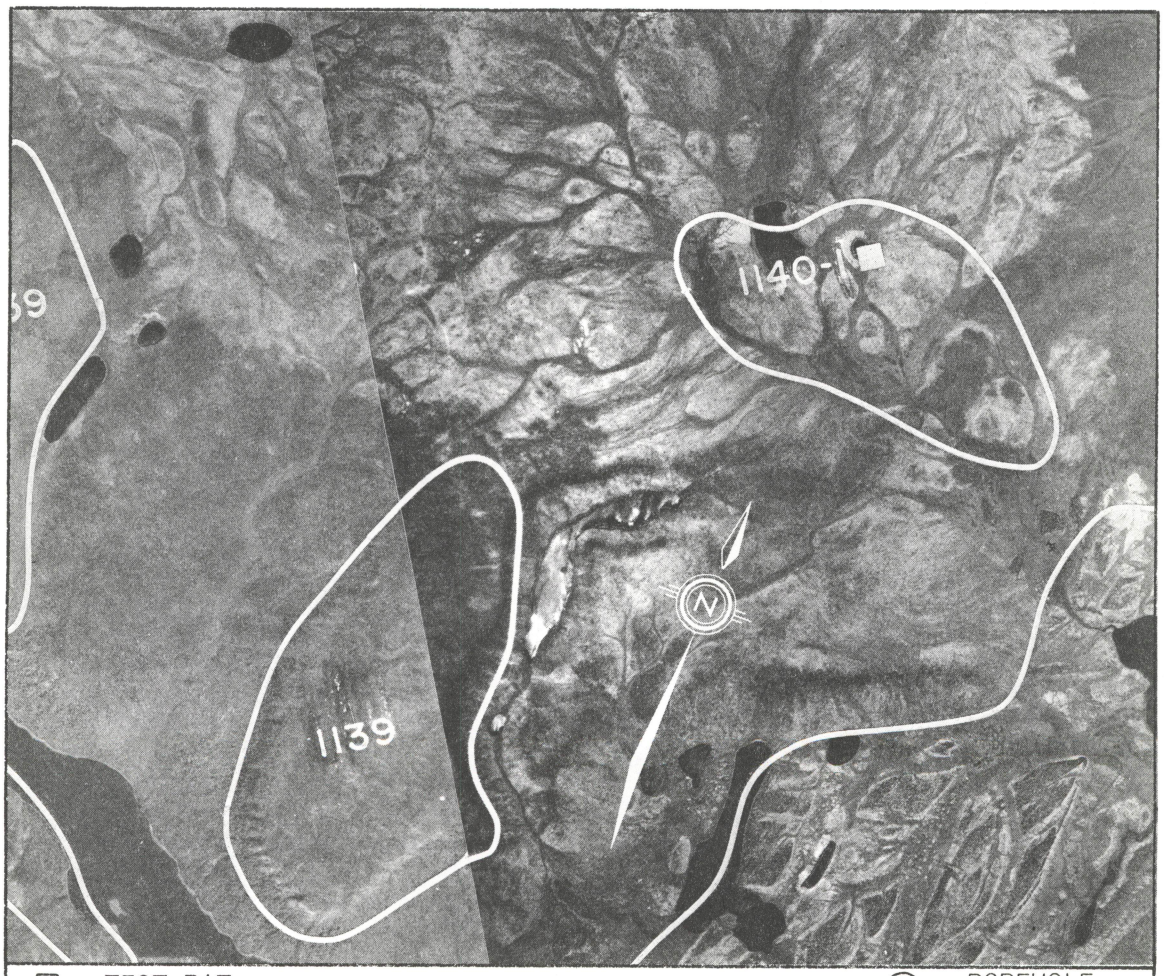
SITE 1140a

Location: Site 1140 is situated 12 miles north of Travaillant Lake. Proposed highway and pipeline routes are 24 and 28 miles south of the site respectively.

Geology: Site 1140 is a fossil lake bottom.

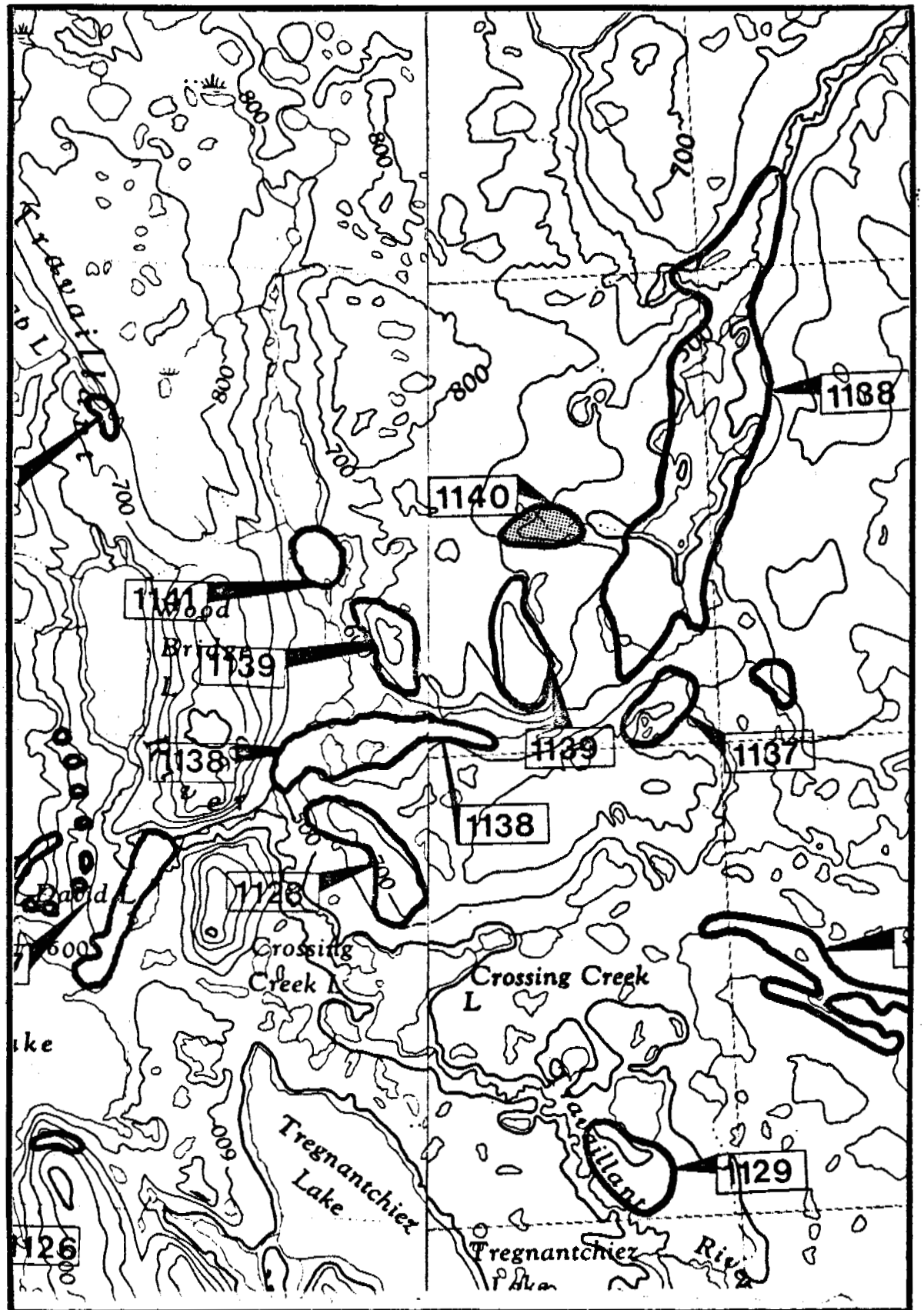
Material: Silty clay.

Assessment: The material at site 1140 is unsuitable for construction purposes. The site is not recommended for development.



□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A22935-100 SCALE: 1" = 3000' (approx.)



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: TRAVAILLANT LAKE 106-O
ARTIC RED RIVER 106-N

SCALE: 1:125,000

SITE 1140

ENVIRONMENTAL SENSITIVITY INDEX

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	TERRAIN 1 (2) 3 4 5 Rating: 10	Formation Stability Ice Content	Flat Land, Terrace, Knoll, Rolling, Outcrop, Ridge, Scarp, Overburden Type & Depth, Wet Site, Dry Site.
5	VEGETATION 1 (2) 3 4 5 Rating: 10	Aesthetic Value Habitat Value	Marsh Black Spruce Muskeg White Spruce Mixed Conifer Conifer - Deciduous Deciduous Dry Slopes Riparian
15	MAMMALS 1 (2) 3 4 5 Rating: 30	Ungulates Furbearers Carnivores Small Mammals	Winter Range, Summer Range, Migration Route, Denning Area, Dams and Lodges, Special Habitat Use.
10	BIRDS (1) 2 3 4 5 Rating: 10	Waterfowl-Swans, Geese, Ducks Game Birds Raptors Shorebirds Passerine	Migration Pathway, Moulting, Spring Staging, Fall Staging, Nesting-Brooding, Perching, Winter Habitat.
10	FISHERY 1 (2) 3 4 5 Rating: 20	Lakes, Tributaries Mackenzie River: Whitefish, Grayling, Pike, Trout-Perch, Lake Trout, Burbot, Suckers, Stickleback Smelt, Sculpin, Goldeye, Chub, Dace, Walleye, Char, Cisco	Spawning, Nursery, Feeding, Overwintering. Major Migration Route. Siltation of Spawning Areas, Benthic Communities. Toxic Material Spill. Slumps, Velocity Increments, Migration Barriers. Eutrophication. Blasting.
5	ARCHAEOLOGY 1 (2) 3 4 5 Rating: 10	Paleontology Pre-Historic Historic	Probability of Discovery. Low, Medium, High. Known Sites.
10	AESTHETICS (1) 2 3 4 5 Rating: 10	Visible from: Physical Disturbance	River, Highway, Air. Dust, Waste, Stockpiles, Noises.
15	RESOURCE UTILIZATION 1 2 (3) 4 5 Rating: 45	Fort Good Hope Arctic Red R. Inuvik	Improved Access, Traplines, Hunting, Fishing, Domestic, Commercial.
15	ASSOCIATED DISTURBANCES 1 2 3 4 (5) Rating: 75	Access Roads Miles From Highway Miles From Pipeline Hydrologic Alterations Continued Use For Maintenance.	0-2, 2-5, 5-10, 10+ 0-2, 2-5, 5-10, 10+ Cuts and Fills, Creek Crossings, Compaction, Slumping, Erosion. Stockpiles, Waste, Dust.
10	RESTORATION (1) 2 3 4 5 Rating: 10	Soil Stabilization Visual Improvement Habitat Replacement	Natural Regeneration. Grass-Legume Seeding. Transplants. Sustained Maintenance. Erosion Control Systems.

R.I.R. - Relative Importance Units - Base of 100 units.

NOTE: SENSITIVITY INDEX RANGE

MINIMAL SENSITIVITY		MAXIMUM SENSITIVITY
100	TO	500

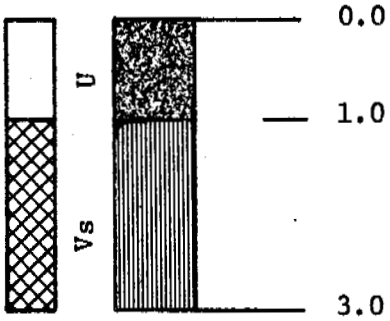
TOTAL INDEX: 230

SPECIAL CONCERNS: Within winter range for Barren-Ground Caribou. Headwater area.

F.F. SLANEY & COMPANY LIMITED
VANCOUVER, B. C.

TEST PIT LOG

TP 1140-1



Peat, dark brown, fibrous

Silt, medium brown clay
sandy with gravel inclusions

SITE 1141

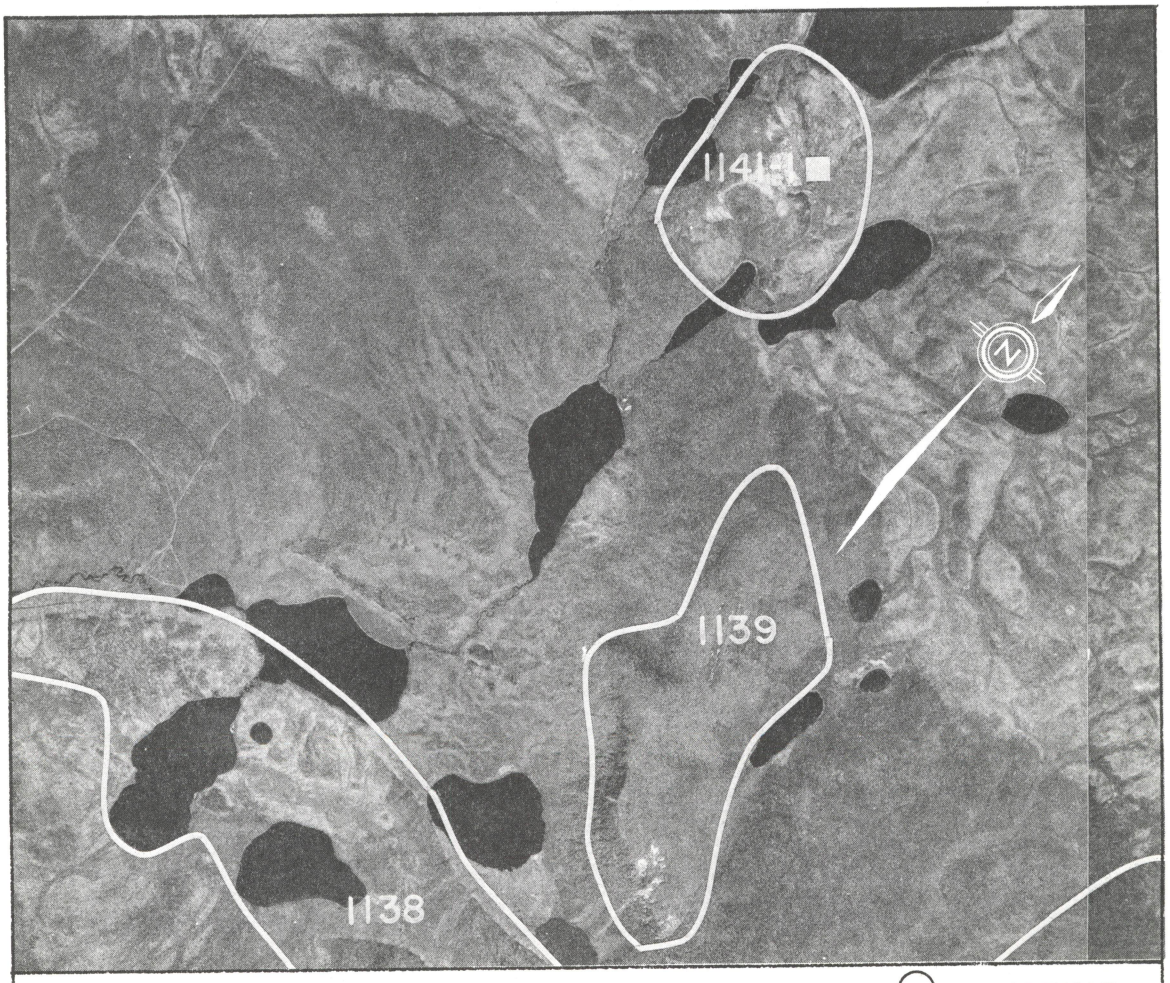
Location: Site 1141 is situated 12 miles north of Travaillant Lake. The proposed highway route is 24 miles SE of the site.

Geology: The material at site 1141 is contained in a small low outwash deposit.

Material: Sand and gravel, trace silt, fairly well graded.

Area: 175 acres.

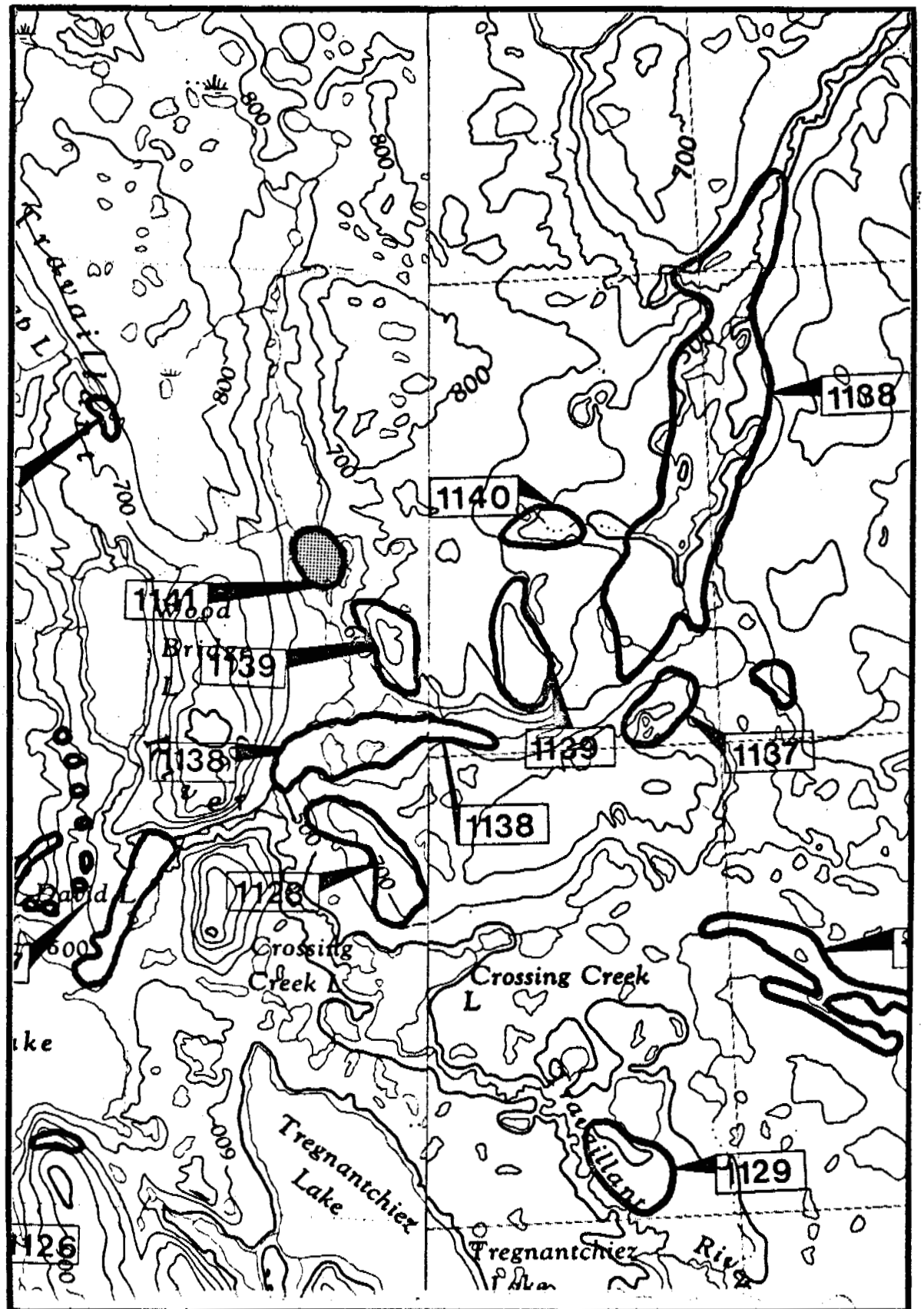
Drainage: The site is poorly drained and swampy.



□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A22935-201 SCALE: 1" = 3000' (approx.)

Assessment: Test pitting at site 1141 encountered good quality gravel overlain by a few inches of moss. Surface moisture content is reasonable but with depth may increase. Drilling at the site to prove the deposit is recommended prior to further development consideration. The site has been assessed as a moderately high environmental sensitivity rating. Access to the site is difficult because of hilly, thermally sensitive terrain and numerous lakes. Haulage distance to proposed construction sites is extremely long. Site 1141 has a promising potential as a source of borrow material but is unlikely to be developed because of the long haulage distances.



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: TRAVAILLANT LAKE 106-O
ARTIC RED RIVER 106-N

SCALE: 1:125,000

SITE 1141

ENVIRONMENTAL SENSITIVITY INDEX

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	TERRAIN 1 2 (3) 4 5 Rating: 15	Formation Stability Ice Content	Flat Land, Terrace, Knoll, Rolling, Outcrop, Ridge, Scarp, Overburden Type & Depth, Wet Site, Dry Site.
5	VEGETATION 1 (2) 3 4 5 Rating: 10	Aesthetic Value Habitat Value	Marsh Black Spruce Muskeg White Spruce Mixed Conifer Conifer - Deciduous Deciduous Dry Slopes Riparian
15	MAMMALS 1 2 (3) 4 5 Rating: 45	Ungulates Furbearers Carnivores Small Mammals	Winter Range, Summer Range, Migration Route, Denning Area, Dams and Lodges, Special Habitat Use.
10	BIRDS 1 (2) 3 4 5 Rating: 20	Waterfowl-Swans, Geese, Ducks Game Birds Raptors Shorebirds Passerine	Migration Pathway, Moulting, Spring Staging, Fall Staging, Nesting-Brooding, Perching, Winter Habitat.
10	FISHERY 1 2 (3) 4 5 Rating: 30	Lakes, Tributaries Mackenzie River: Whitefish / Smelt Grayling / Sculpin Pike / Goldeye Trout-Perch / Chub Lake Trout / Dace Burbot / Walleye Suckers / Char Stickleback / Cisco	Spawning, Nursery, Feeding, Overwintering. Major Migration Route. Siltation of Spawning Areas, Benthic Communities. Toxic Material Spill. Slumps, Velocity Increments, Migration Barriers. Eutrophication. Blasting.

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	ARCHAEOLOGY 1 2 (3) 4 5 Rating: 15	Paleontology Pre-Historic Historic	Probability of Discovery. Low, Medium, High. Known Sites.
10	AESTHETICS (1) 2 3 4 5 Rating: 10	Visible from: Physical Disturbance	River, Highway, Air. Dust, Waste. Stockpiles. Noises.
15	RESOURCE UTILIZATION 1 (2) 3 4 5 Rating: 30	Fort Good Hope Arctic Red R. Inuvik	Improved Access. Traplines. Hunting. Fishing. Domestic. Commercial.
15	ASSOCIATED DISTURBANCES 1 2 3 4 (5) 75 Rating:	Access Roads Miles From Highway Miles From Pipeline Hydrologic Alterations Continued Use For Maintenance.	0-2, 2-5, 5-10, 10+ 0-2, 2-5, 5-10, 10+ Cuts and Fills. Creek Crossings. Compaction, Slumping, Erosion. Stockpiles, Waste, Dust.
10	RESTORATION (1) 2 3 4 5 Rating: 10	Soil Stabilization Visual Improvement Habitat Replacement	Natural Regeneration. Grass-Legume Seeding. Transplants. Sustained Maintenance. Erosion Control Systems.

R.I.R. - Relative Importance Units - Base of 100 units.

NOTE: SENSITIVITY INDEX RANGE

MINIMAL SENSITIVITY		MAXIMUM SENSITIVITY
100	TO	500

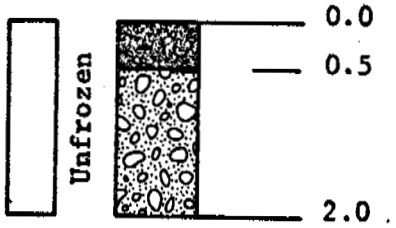
TOTAL INDEX: 260

SPECIAL CONCERNS: Straddles lake drainage. Within Barren-Ground Caribou winter range. Recommend maintenance of aquatic habitats.

F.F. SLANEY & COMPANY LIMITED
VANCOUVER, B. C.

TEST PIT LOG

TP 1141-1

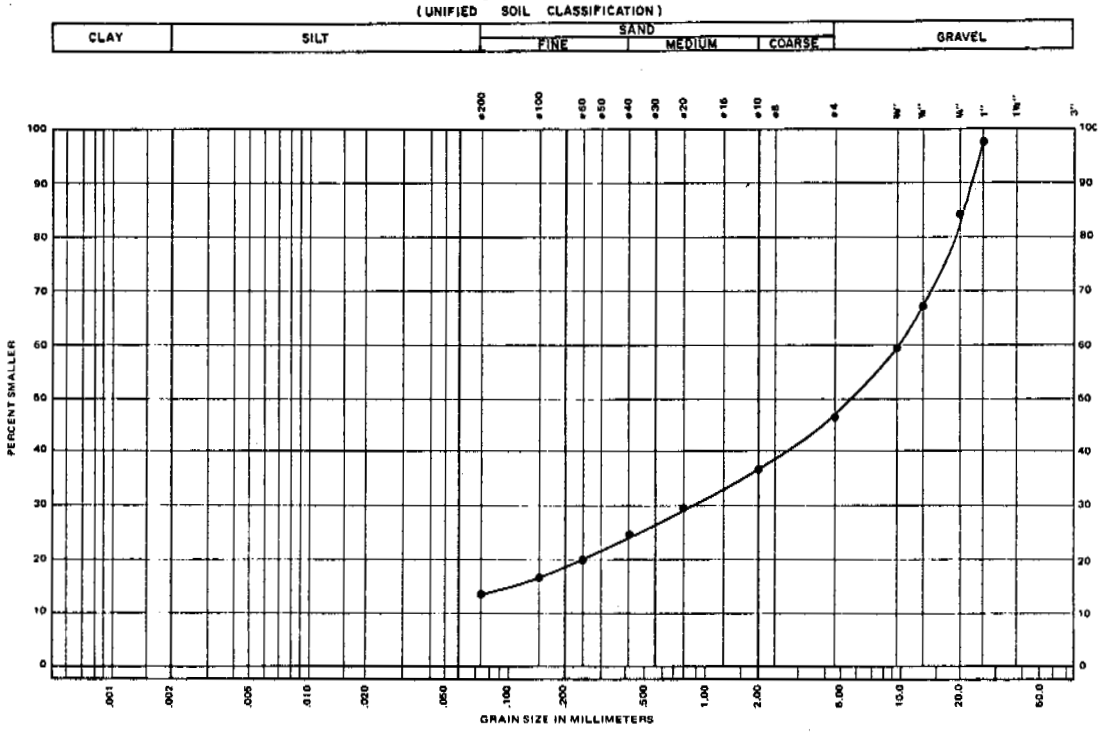


Moss

Gravel, silty
dry
dense

53% GRAVEL
34% SAND
13% SILT

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



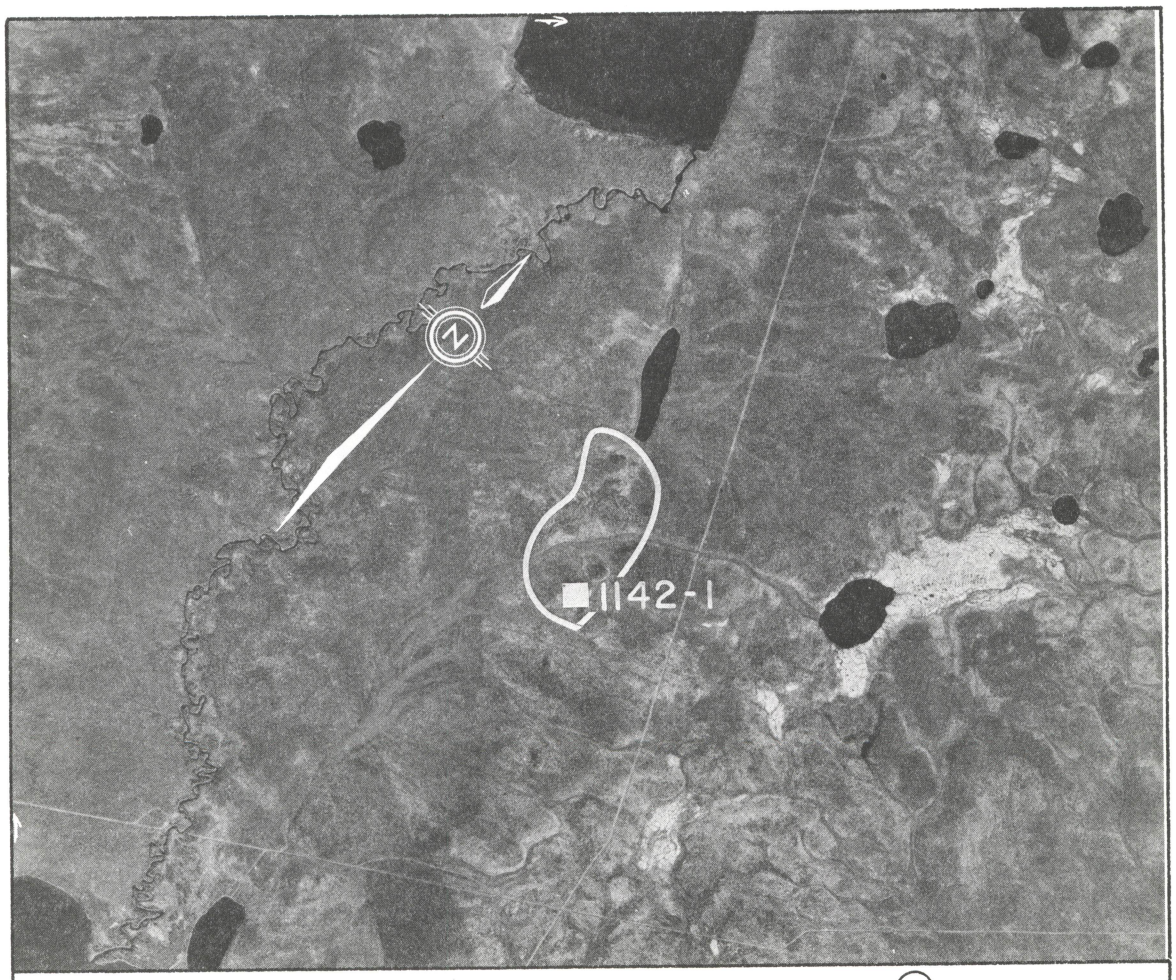
EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Gravel and Sand and Some Silt (GW-GM) M/C = 5.5%

PROJECT Granular Resources
JOB No. E-666 DATE Nov. 29/73
SAMPLE No. TP 1141-1
DEPTH 2'

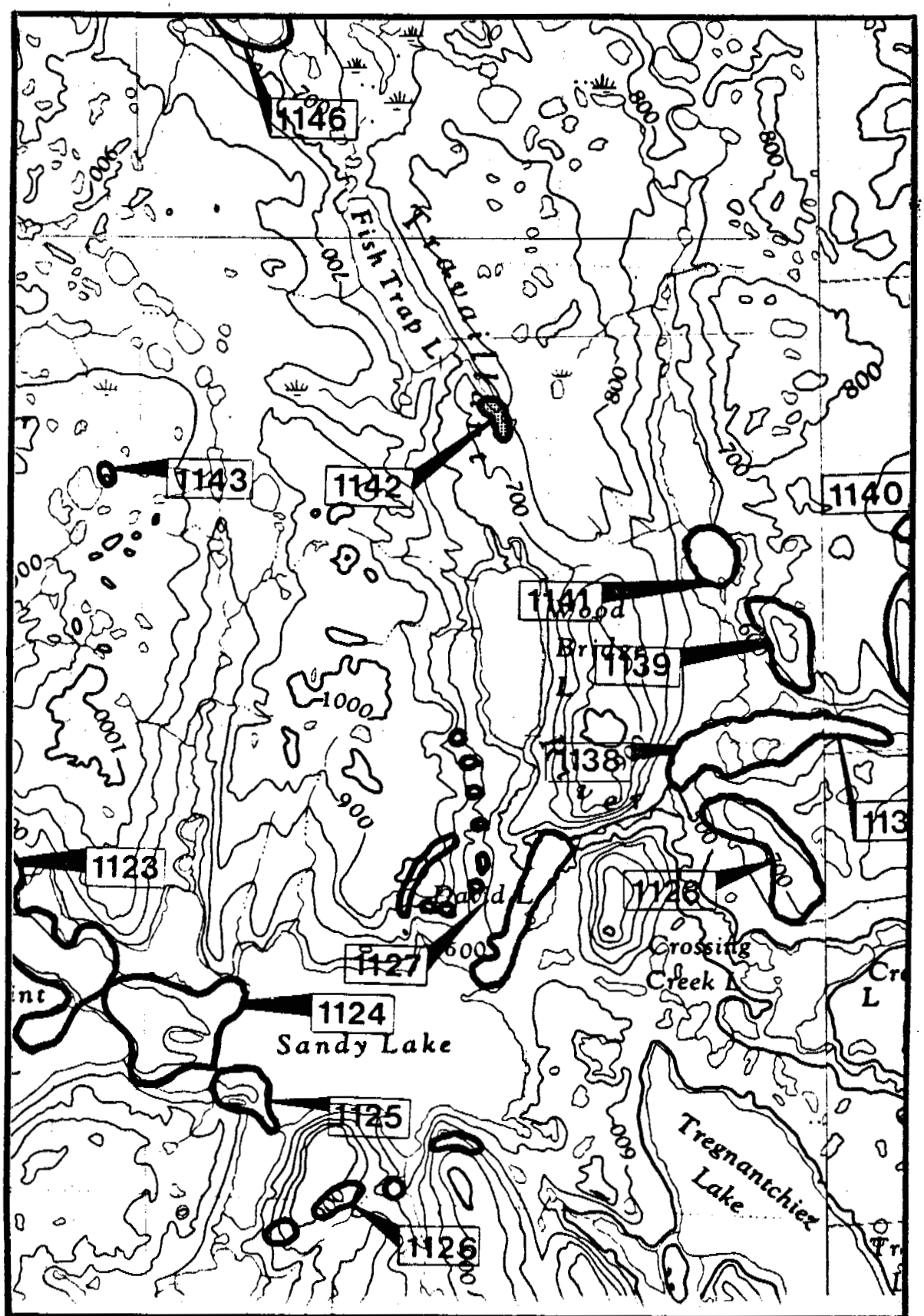
SITE 1142a

Location:	Site 1142 is located 1 mile south-east of Fish Lake. Proposed pipeline and highway routes are 25 miles south of the site.
Geology:	Site 1142 is a small kame complex.
Material:	Gravelly silt and sand.
Assessment:	The material encountered at site 1142 is of poor quality and generally unsuitable for use as a construction material. Site 1142 is <u>not</u> recommended for development.



□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A22935-199 SCALE: 1" = 3000' (approx.)



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: TRAVAILLANT LAKE 106-O
ARTIC RED RIVER 106-N

SCALE: 1:125,000

SITE 1142

ENVIRONMENTAL SENSITIVITY INDEX

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	TERRAIN 1 2 (3) 4 5 Rating: 15	Formation Stability Ice Content	Flat Land, Terrace, Knoll, Rolling, Outcrop, Ridge, Scarp, Overburden Type & Depth, Wet Site, Dry Site.
5	VEGETATION 1 2 (3) 4 5 Rating: 15	Aesthetic Value Habitat Value	Marsh Black Spruce Muskeg White Spruce Mixed Conifer Conifer - Deciduous Deciduous Dry Slopes Riparian
15	MAMMALS 1 2 (3) 4 5 Rating: 45	Ungulates Furbearers Carnivores Small Mammals	Winter Range, Summer Range, Migration Route, Denning Area, Dams and Lodges, Special Habitat Use.
10	BIRDS 1 2 (3) 4 5 Rating: 30	Waterfowl-Swans, Geese, Ducks Game Birds Raptors Shorebirds Passerine	Migration Pathway, Moulting, Spring Staging, Fall Staging, Nesting-Brooding, Perching, Winter Habitat.
10	FISHERY 1 (2) 3 4 5 Rating: 20	Lakes, Tributaries Mackenzie River: Whitefish / Smelt Grayling / Sculpin Pike / Goldeye Trout-Perch / Chub Lake Trout / Dace Burbot / Walleye Suckers / Char Stickleback / Cisco	Spawning, Nursery, Feeding, Overwintering. Major Migration Route. Siltation of Spawning Areas, Benthic Communities. Toxic Material Spill. Slumps, Velocity Increments, Migration Barriers. Eutrophication. Blasting.

R.I.R. - Relative Importance Units - Base of 100 units.

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	ARCHAEOLOGY 1 2 (3) 4 5 Rating: 15	Paleontology Pre-Historic Historic	Probability of Discovery. Low, Medium, High. Known Sites.
10	AESTHETICS 1 2 3 4 5 Rating: 10	Visible from: Physical Disturbance	River, Highway, Air. Dust, Waste, Stockpiles. Noises.
15	RESOURCE UTILIZATION 1 2 3 (4) 5 Rating: 60	Fort Good Hope Arctic Red R. Inuvik	Improved Access. Traplines. Hunting. Fishing. Domestic. Commercial.
15	ASSOCIATED DISTURBANCES 1 2 (3) 4 5 Rating: 75	Access Roads Miles From Highway Miles From Pipeline Hydrologic Alterations Continued Use For Maintenance.	0-2, 2-5, 5-10, 10+ 0-2, 2-5, 5-10, 10+ Cuts and Fills. Creek Crossings. Compaction, Slumping, Erosion. Stockpiles, Waste, Dust.
10	RESTORATION (1) 2 3 4 5 Rating: 10	Soil Stabilization Visual Improvement Habitat Replacement	Natural Regeneration. Grass-Legume Seeding. Transplants. Sustained Maintenance. Erosion Control Systems.

NOTE: SENSITIVITY INDEX RANGE

MINIMAL SENSITIVITY		MAXIMUM SENSITIVITY
100	TO	500

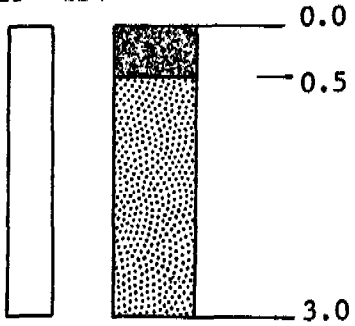
TOTAL INDEX: 295

SPECIAL CONCERNS: On ridge above Fish Trap Lake. Siltation control for aquatic habitat protection. Within Barren Ground Caribou winter range.

F.F. SLANEY & COMPANY LIMITED
VANCOUVER, B. C.

TEST PIT LOG

TP 1142-1



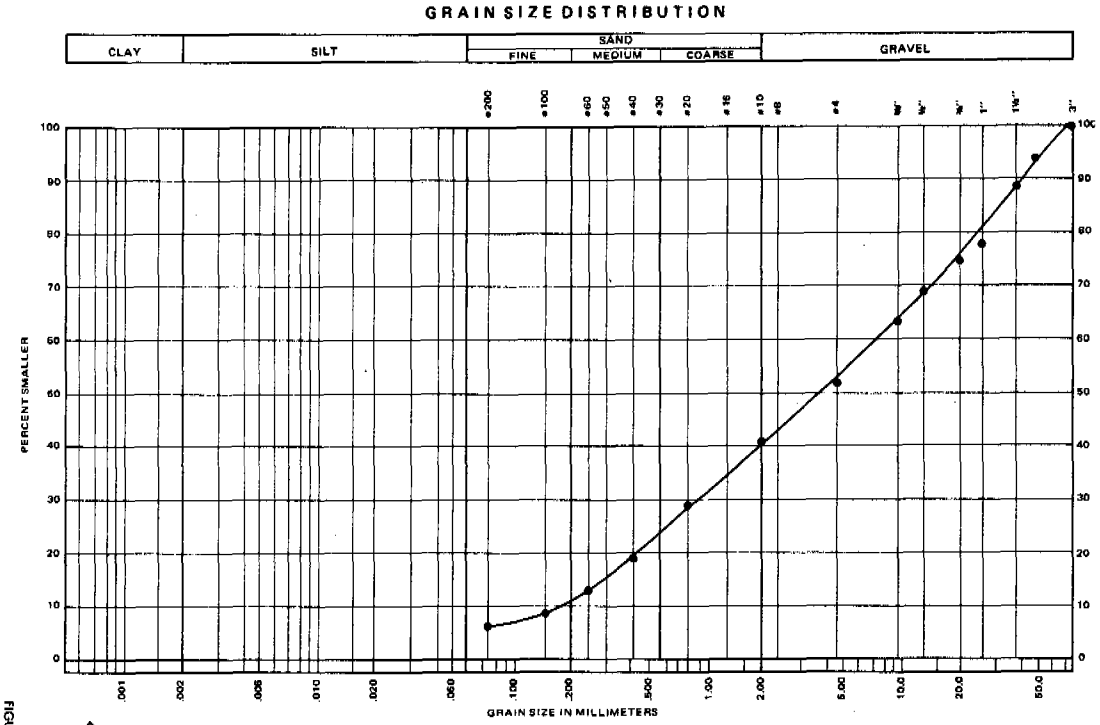
0.0 Moss

0.5 Gravelly sand, silty
light brown
moist
some plasticity

25% GRAVEL
41% SAND
34% SILT & CLAY

3.0

GRAIN SIZE DISTRIBUTION



FIGURE

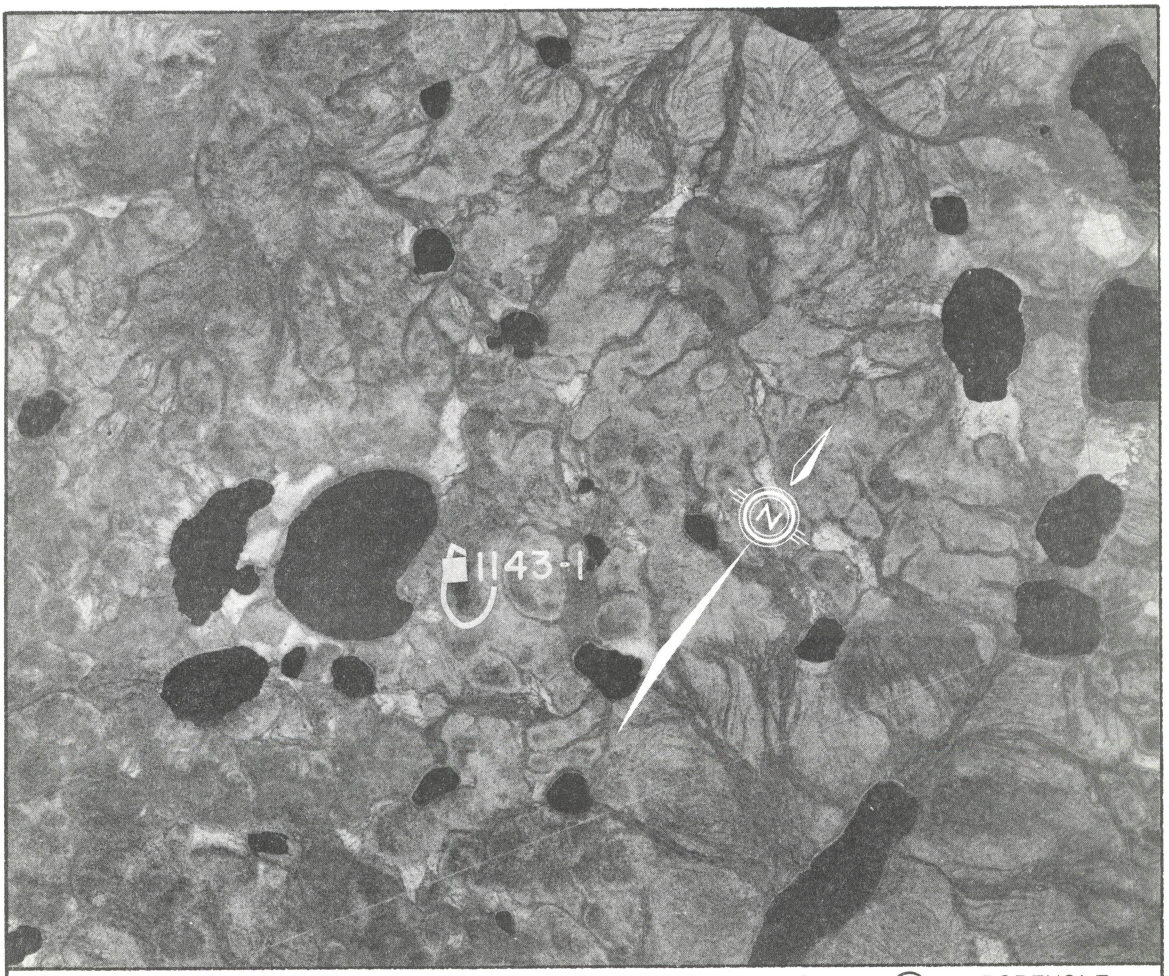
E.W. Brooker & Associates Ltd.

SAMPLE DESCRIPTION Sand and Gravel
With Trace of Silt (GW-GM) M/C=2.6%

PROJECT Granular Resources
JOB No. E-666 DATE
SAMPLE No. TP 1143-1
DEPTH 3'

SITE 1143a

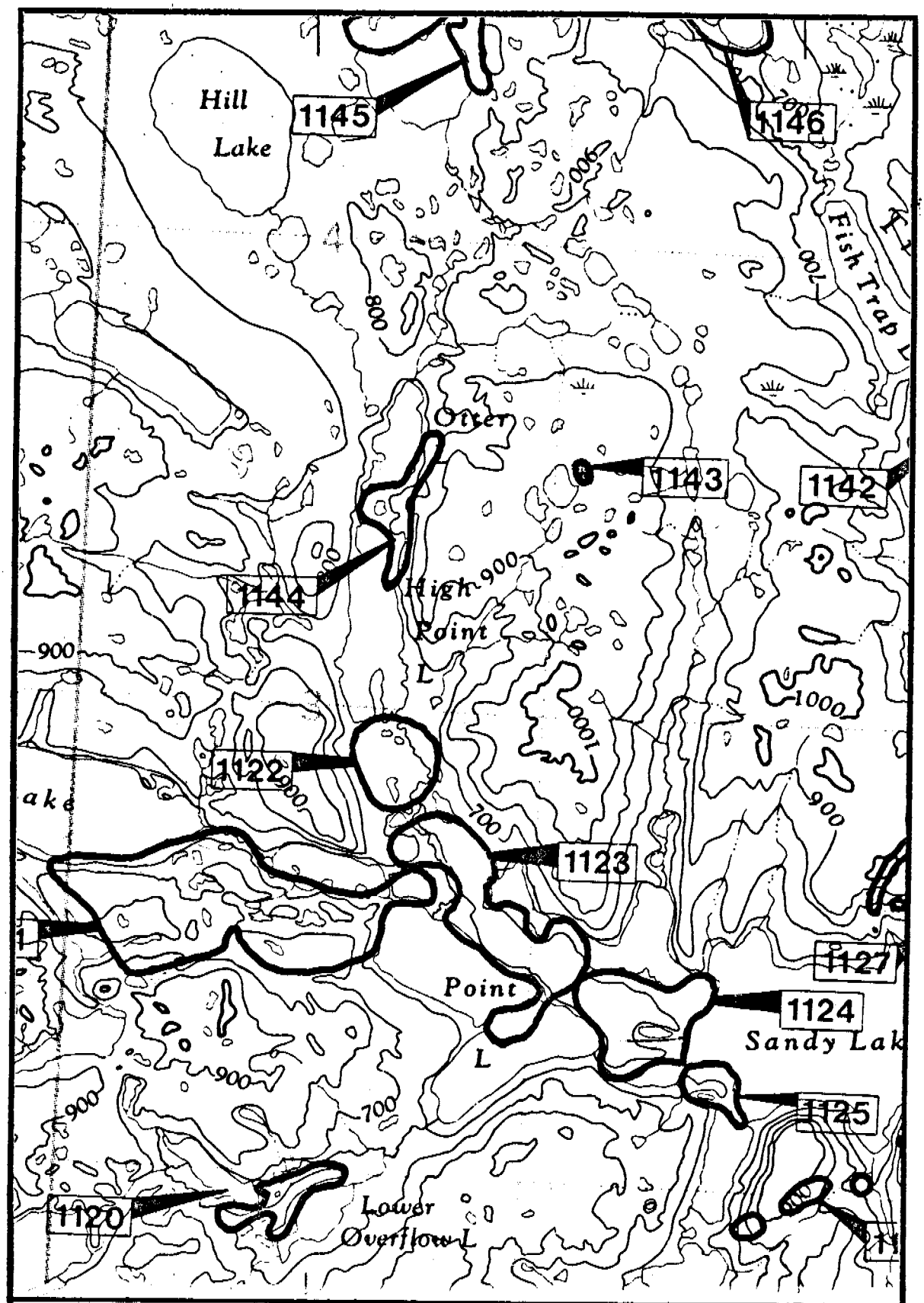
Location:	Site 1143 is situated 7 miles north of Point Lake. Proposed highway pipeline routes are 20 miles south of the site.
Geology:	Site 1143 is a small isolated kame.
Material:	Sand and gravel, trace silt, well graded.
Drainage:	The site is well drained.



□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A22935-167 SCALE: 1" = 3000' (approx.)

Assessment: The borrow at site 1143 is of good quality but very low volume. The site is located a great distance from proposed pipeline and highway locations. Access to the site is relatively difficult because of hilly, thermally sensitive terrain and numerous lakes. Overburden is thin to negligible but tree cover is dense. It is only feasible to develop the site for a localized, small scale construction project. Site 1143 is <u>not</u> recommended for development.



SITE LIMITS

PROPOSED GAS PIPELINE

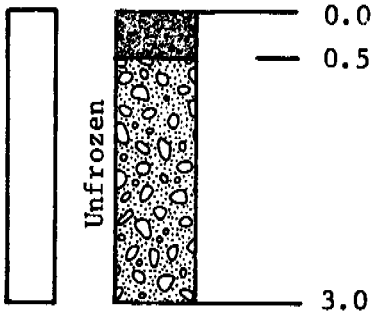
PROPOSED MACKENZIE HIGHWAY

MAPS: ARTIC RED RIVER 106-N

SCALE: 1:125,000

TEST PIT LOG

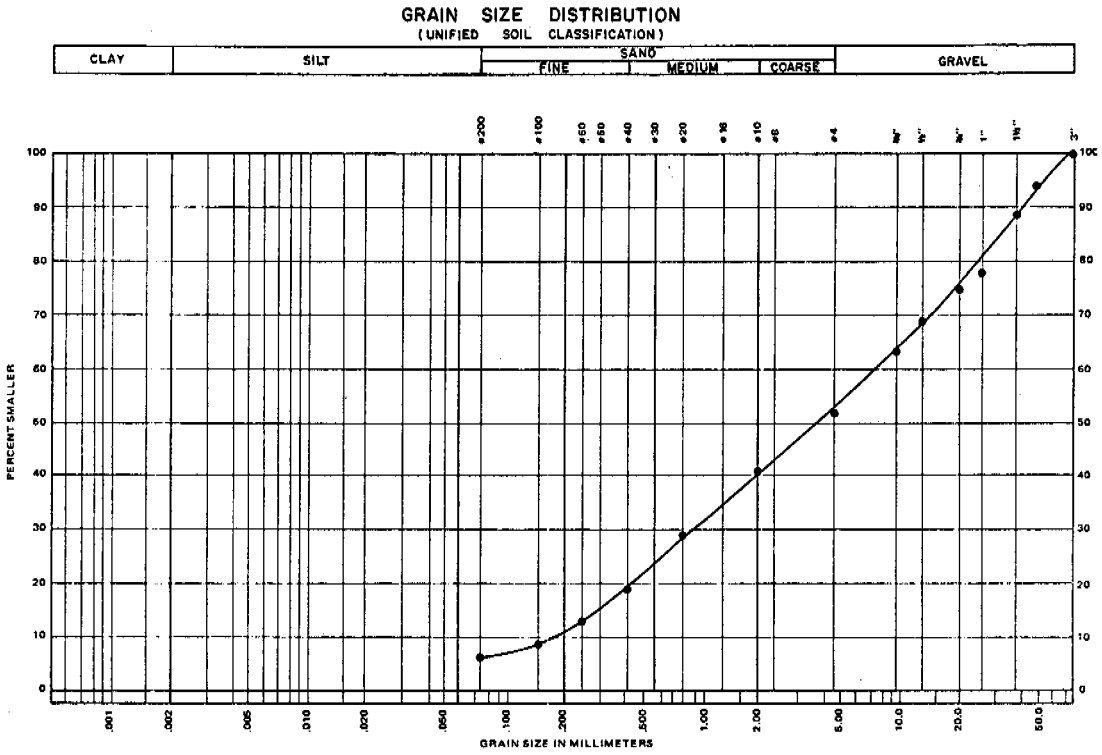
TP 1143-1



Moss

Gravel, dry
well graded
grey

48% GRAVEL
46% SAND
6% SILT & CLAY



EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Sand and Gravel
With Trace of Silt (GW-GM) M/C=2.6%

PROJECT Granular Resources
JOB No. E-666
DATE
SAMPLE No. TP 1143-1
DEPTH 3'

SITE 1144

Location: The site is situated between High Point Lake and Otter Lake. Proposed pipeline and highway routes are 19 and 21 miles south-west of the site, respectively.

Geology: Site 1144 is a relatively large kame kame terrace complex. Significant variation in the material should be anticipated.

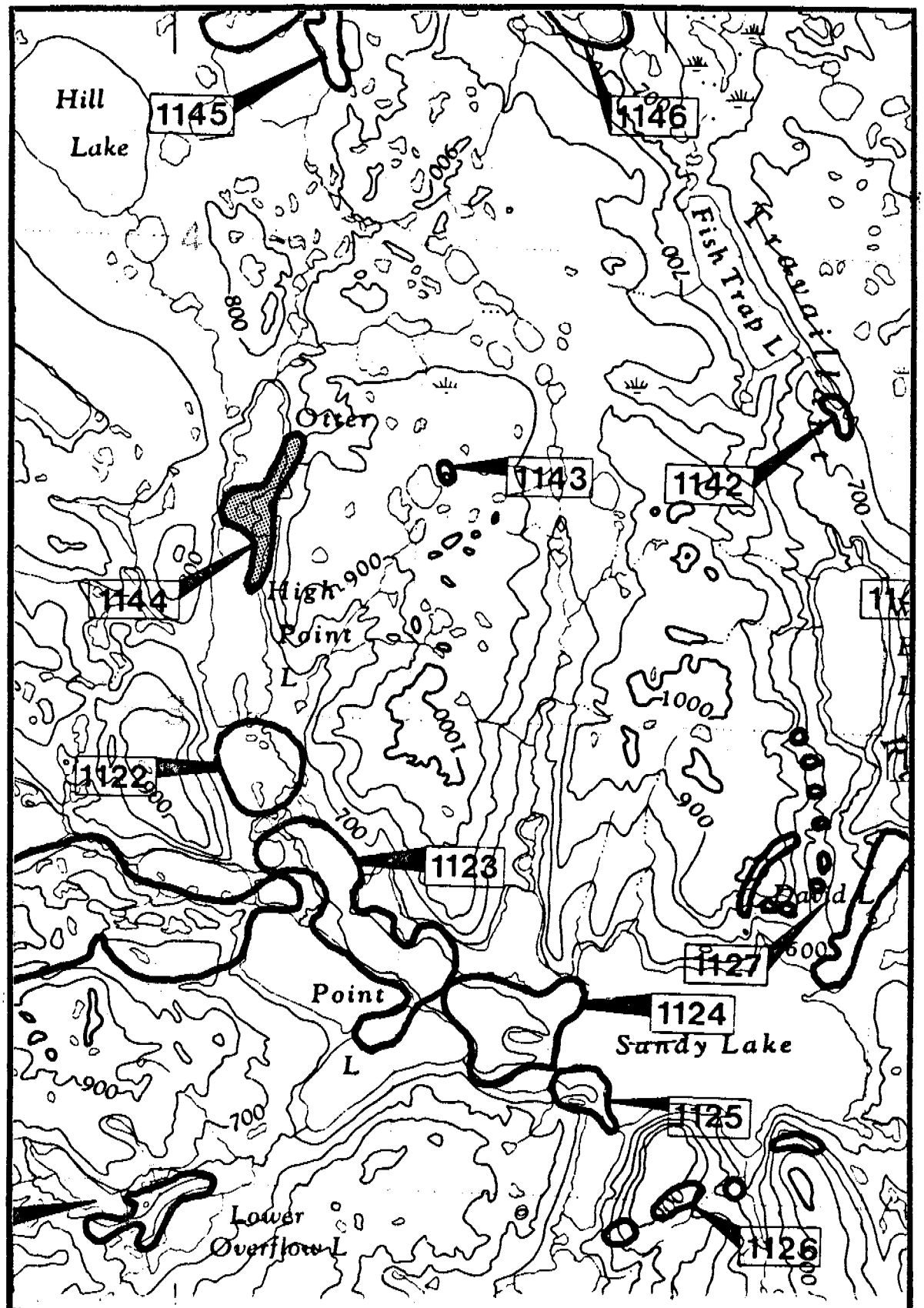
Material: Silt and sand and gravel, well graded.

Drainage: The site is poorly drained into Otter and High Point Lakes. Low areas on the site are marshy.

□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A23016-30 SCALE: 1" = 3000' (approx.)

Assessment: The granular material at site 1144 is of fair quality suitable for use as general fill. Volume yield is expected to be moderate but moisture contents are high which will necessitate stockpiling and draining before use. Clay overburden several feet thick will have to be removed and stockpiled for use in restoration. Vegetative cover consists of dense brush and stunted birch and spruce. Drilling will be necessary to prove the deposit and establish permafrost depth. The site has a high environmental sensitivity rating. Access to the site is rather difficult because of hilly, thermally sensitive terrain and numerous lakes. Haulage distance to proposed construction sites is excessively long. Unless the locations of construction sites are altered so that they are closer to the site it appears that haulage distance will render the feasibility of developing site 1144 unlikely.



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: ARTIC RED RIVER 106-N

SCALE: 1:125,000

SITE 1144

ENVIRONMENTAL SENSITIVITY INDEX

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	TERRAIN 1 (2) 3 4 5 Rating: 10	Formation Stability Ice Content	Flat Land, Terrace, Knoll, Rolling, Outcrop, Ridge, Scarp, Overburden Type & Depth, Wet Site, Dry Site.
5	VEGETATION 1 (2) 3 4 5 Rating: 10	Aesthetic Value Habitat Value	Marsh Black Spruce Muskeg White Spruce Mixed Conifer Conifer - Deciduous Deciduous Dry Slopes Riparian
15	MAMMALS 1 2 3 (4) 5 Rating: 60	Ungulates Furbearers Carnivores Small Mammals	Winter Range, Summer Range, Migration Route, Denning Area, Dams and Lodges, Special Habitat Use.
10	BIRDS 1 (2) 3 4 5 Rating: 20	Waterfowl-Swans, Geese, Ducks Game Birds Raptors Shorebirds Passerine	Migration Pathway, Moulting, Spring Staging, Fall Staging, Nesting-Brooding, Perching, Winter Habitat.
10	FISHERY 1 2 3 (4) 5 Rating: 40	Lakes, Tributaries Mackenzie River: Whitefish, Smelt Grayling, Sculpin Pike, Goldeye Trout-Perch, Chub Lake Trout, Dace Burbot, Walleye Suckers, Char Stickleback, Cisco	Spawning, Nursery, Feeding, Overwintering. Major Migration Route. Siltation of Spawning Areas, Benthic Communities, Toxic Material Spill. Slumps, Velocity Increments, Migration Barriers. Eutrophication. Blasting.

R.I.R. - Relative Importance Units - Base of 100 units.

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	ARCHAEOLOGY 1 2 (3) 4 5 Rating: 15	Paleontology Pre-Historic Historic	Probability of Discovery. Low, Medium, High. Known Sites.
10	AESTHETICS (1) 2 3 4 5 Rating: 10	Visible from: Physical Disturbance	River, Highway, Air. Dust, Waste, Stockpiles. Noises.
15	RESOURCE UTILIZATION 1 2 3 (4) 5 Rating: 60	Fort Good Hope Arctic Red R. Inuvik	Improved Access. Traplines. Hunting. Fishing. Domestic. Commercial.
15	ASSOCIATED DISTURBANCES 1 2 3 4 (5) Rating: 75	Access Roads Miles From Highway Miles From Pipeline Hydrologic Alterations Continued Use For Maintenance.	0-2, 2-5, 5-10, 10+ 0-2, 2-5, 5-10, 10+ Cuts and Fills. Creek Crossings. Compaction, Slumping, Erosion. Stockpiles, Waste, Dust.
10	RESTORATION (1) 2 3 4 5 Rating: 10	Soil Stabilization Visual Improvement Habitat Replacement	Natural Regeneration. Grass-Legume Seeding. Transplants. Sustained Maintenance. Erosion Control Systems.

NOTE: SENSITIVITY INDEX RANGE

MINIMAL SENSITIVITY		MAXIMUM SENSITIVITY
100	TO	500

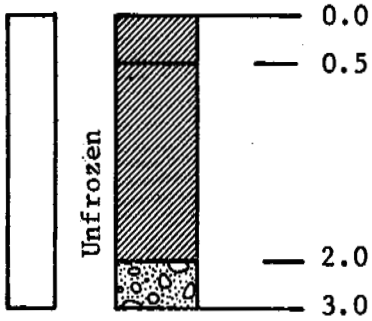
TOTAL INDEX: 310

SPECIAL CONCERNS: Located between lakes and within Barren Ground Caribou range. Buffer zone and habitat maintenance recommended.

F.F. SLANEY & COMPANY LIMITED
VANCOUVER, B. C.

TEST PIT LOG

TP 1144-1



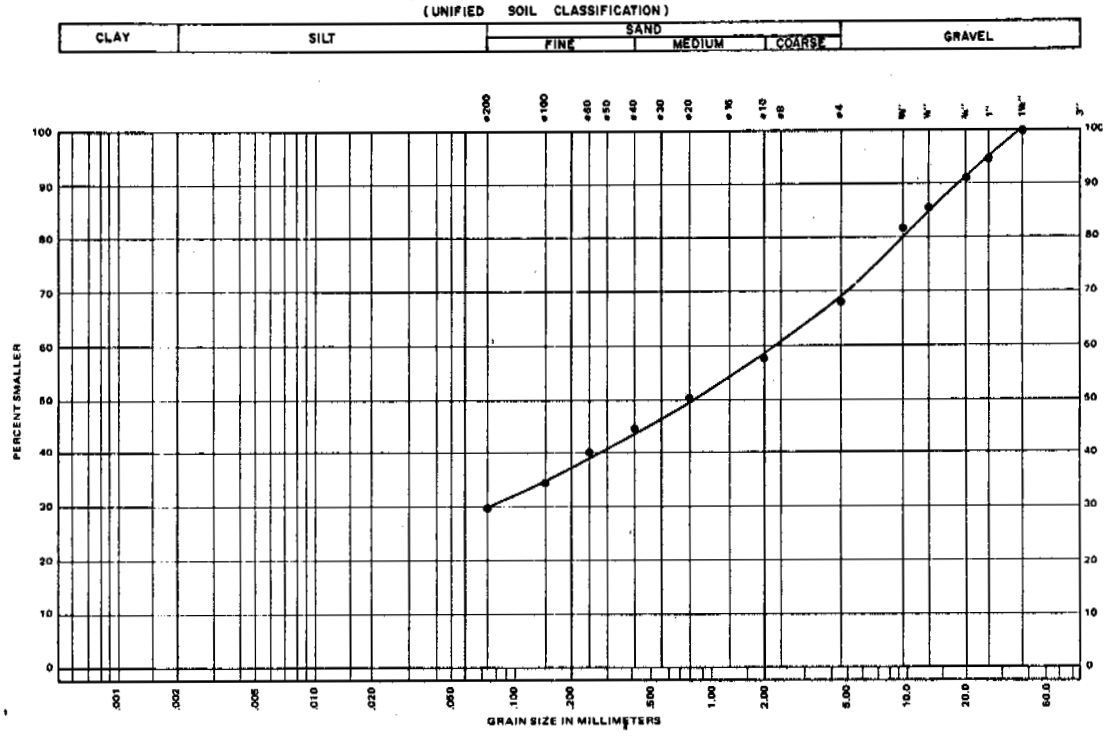
Reddish brown silty clay, organics

Clay, medium brown, silty, wet, rounded gravel inclusions

Gravel, medium brown, sandy, clayey, wet

32% GRAVEL
38% SAND
30% SILT & CLAY

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION (GM) Silt, Sand and Gravel M/C = 12%

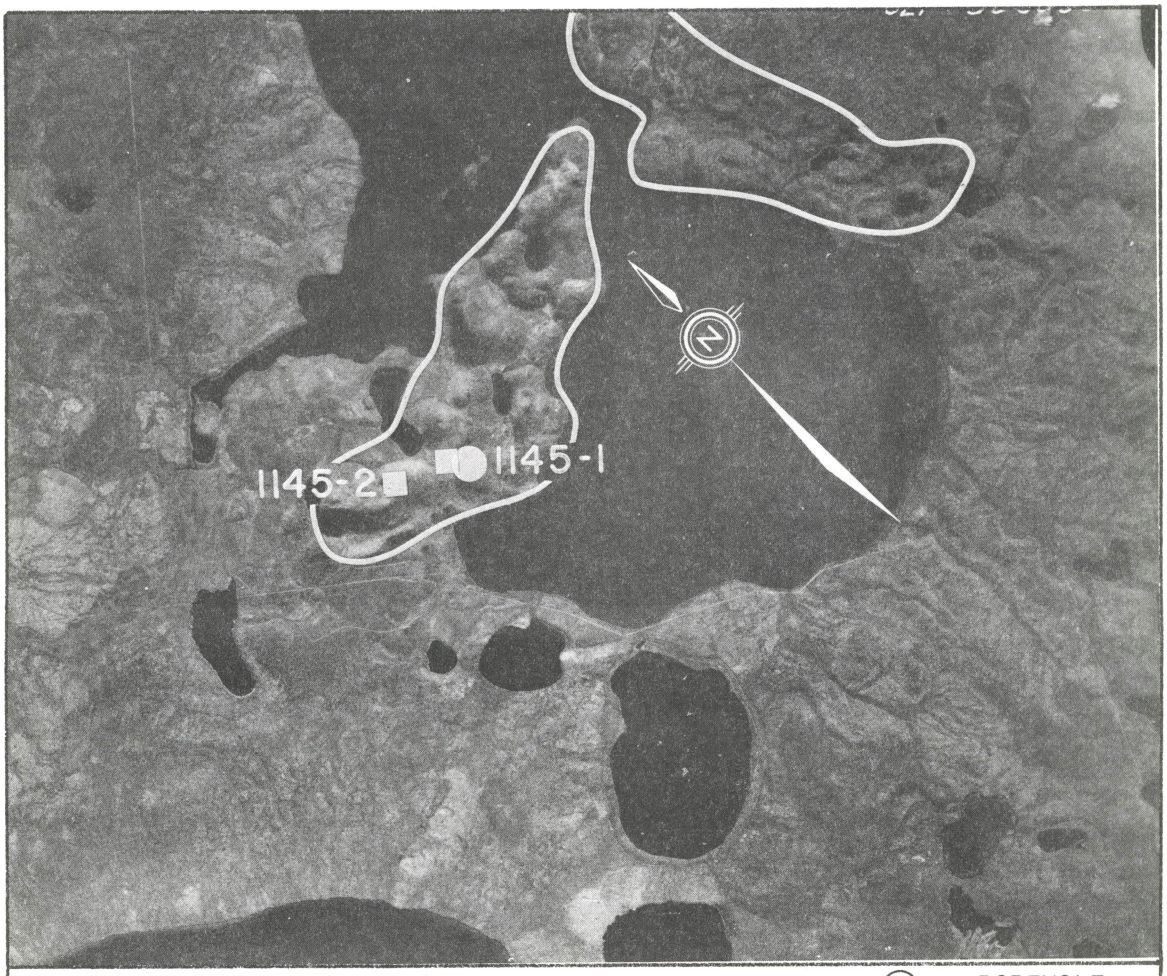
PROJECT Granular Resources
JOB No. E-666 DATE
SAMPLE No. TP 1144-1
DEPTH 3'

SITE 1145a

Location: Site 1145 is situated 2 miles east of Hill Lake and 24 miles NE of the proposed highway and pipeline routes.

Geology: Site 1145 is a relatively large kame complex. Material exhibits considerable variability.

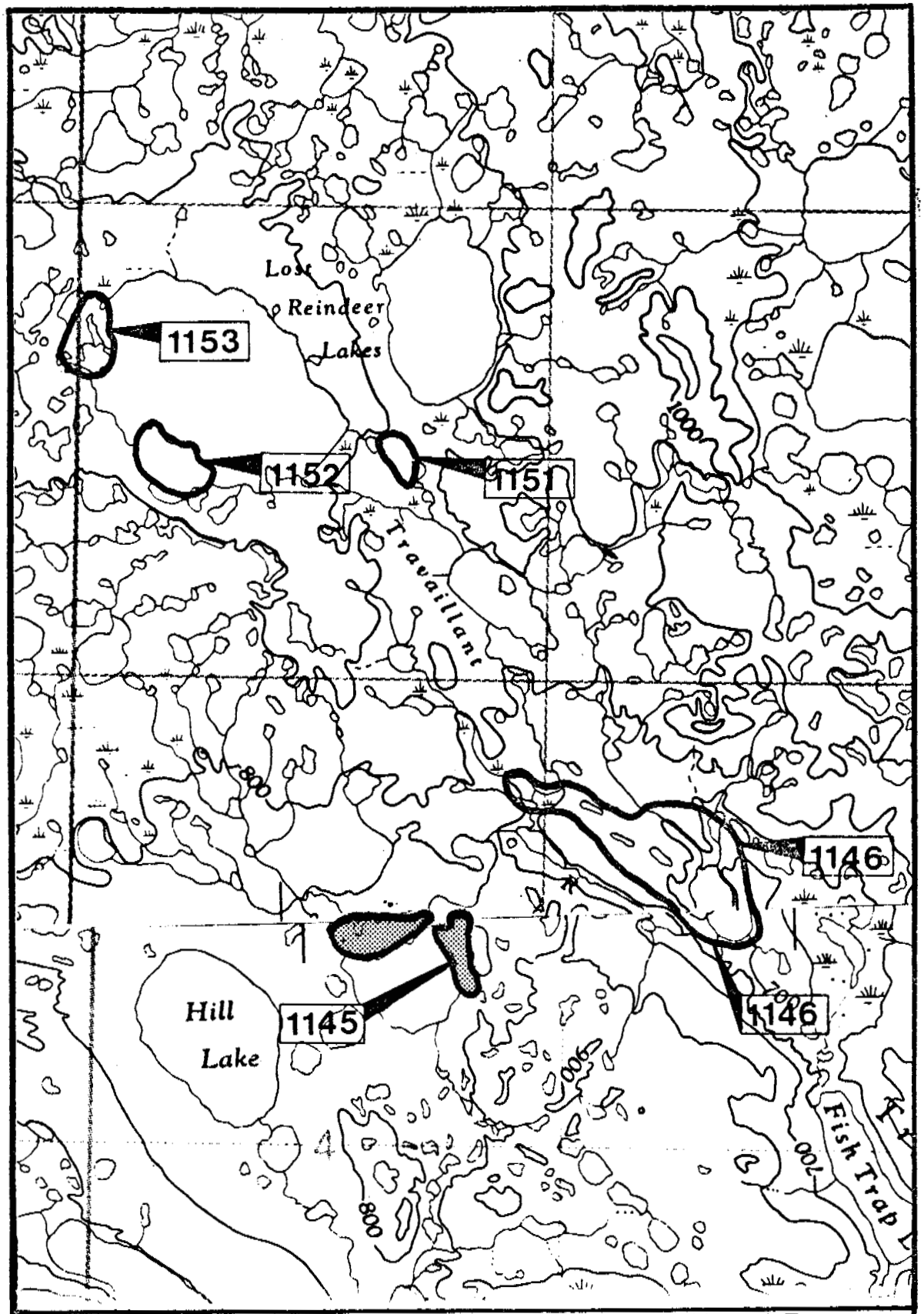
Material: Variable from silt to sand and gravel with some silt.



□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A22935-170 SCALE: 1" = 3000' (approx.)

Assessment: The material at site 1145 is quite variable but generally is unsuitable for construction purposes. A detailed drilling program at the site may reveal material of better quality. The quantity of material available is uncertain due to the variability. Access to the site is somewhat difficult because of hilly, thermally sensitive terrain and numerous lakes. Winter operations will be necessary. Haulage distance to proposed highway and pipeline routes are extremely long. Site 1145 is not recommended for development.



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

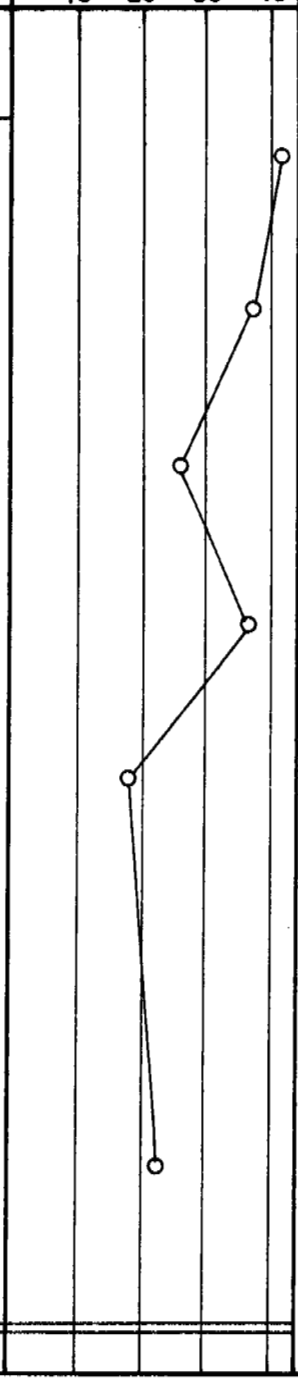
MAPS: ARTIC RED RIVER 106-N
AKLAVIK 107-B

SCALE: 1:125,000

GRANULAR MATERIALS INVENTORY - STAGE III

SITE NO. 1145 HOLE NO. 1 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION
	Pt	PEAT: trace silt, fibrous, brown	NOT FROZEN
1			
	SM	SILT:	
2		trace sand, fine grained, grey	FROZEN
3		-increasing fine sand content, some fine gravel.	
4			
5			
6			
7			
8			
9		-sandy silt, grey, possibly a till	
10		-odd gravel sized particle	
11			
12			
13			
14			
15			
16			
17			
		END OF HOLE	



DATE DRILLED: Sep. 11/73 | LOGGED BY: EBA 104-1

COMPLETION DEPTH: 17.0'

DRILLING METHOD: CONVENTIONAL AIR

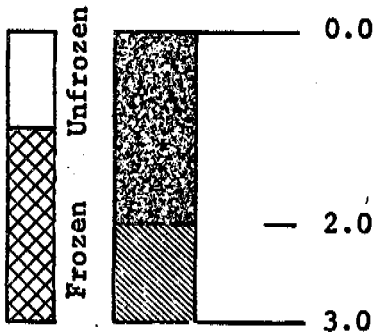
THAW DEPTH: 1.3'

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

TEST PIT LOG

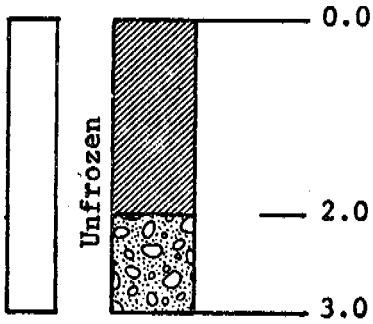
TP 1145-1



Peat

Till, grey clayey sandy

TP 1145-2

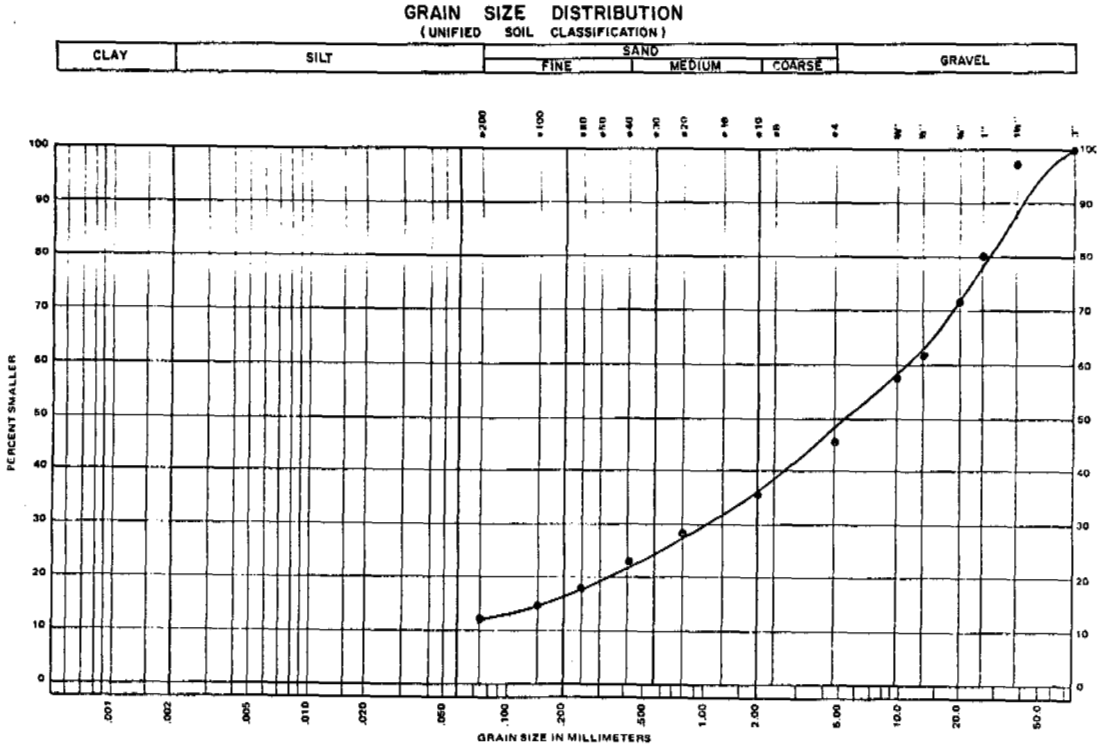


Silt, medium brown with gravel particles, cobbles, reddish brown 0-1'

Gravel, medium brown, silty & sandy well graded

55% GRAVEL
33% SAND
12% SILT & CLAY

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



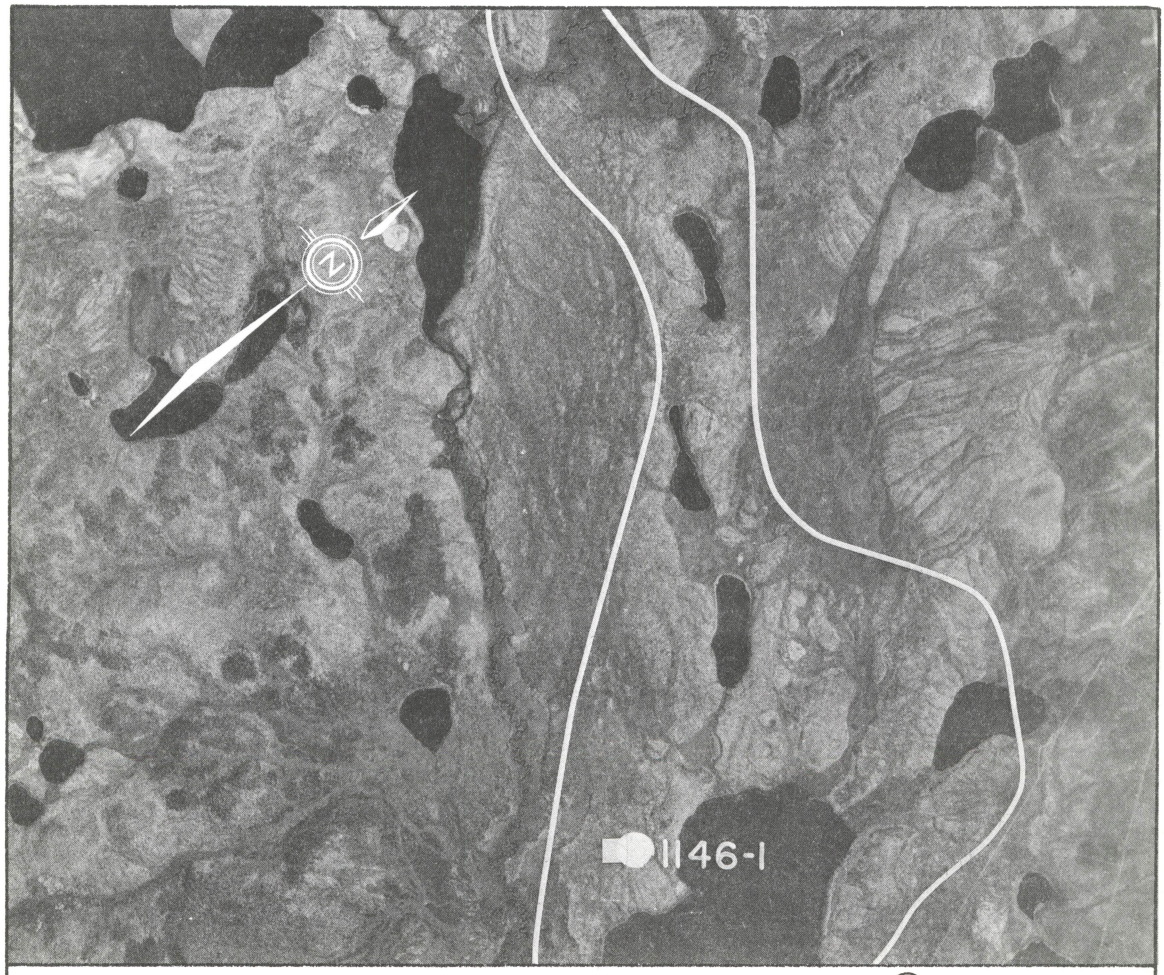
EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Sand and Gravel with Some Silt (GW-GM) M/C=4.5%

PROJECT Granular Resources
JOB No. E-666 DATE Jan. 15/74
SAMPLE No TP 1145-2
DEPTH 3'

SITE 1146

Location:	Site 1146 is situated 3 miles north-west of Fish Trap Lake. Proposed pipeline and highway routes are approximately 26 miles south of the site.
Geology:	The borrow at site 1146 is in an outwash deposit and is expected to be quite uniform.
Material:	Sand and gravel, silty, well graded.
Volume:	13,500,000 cu. yd. volume estimate seems realistic.
Area:	700 acres.

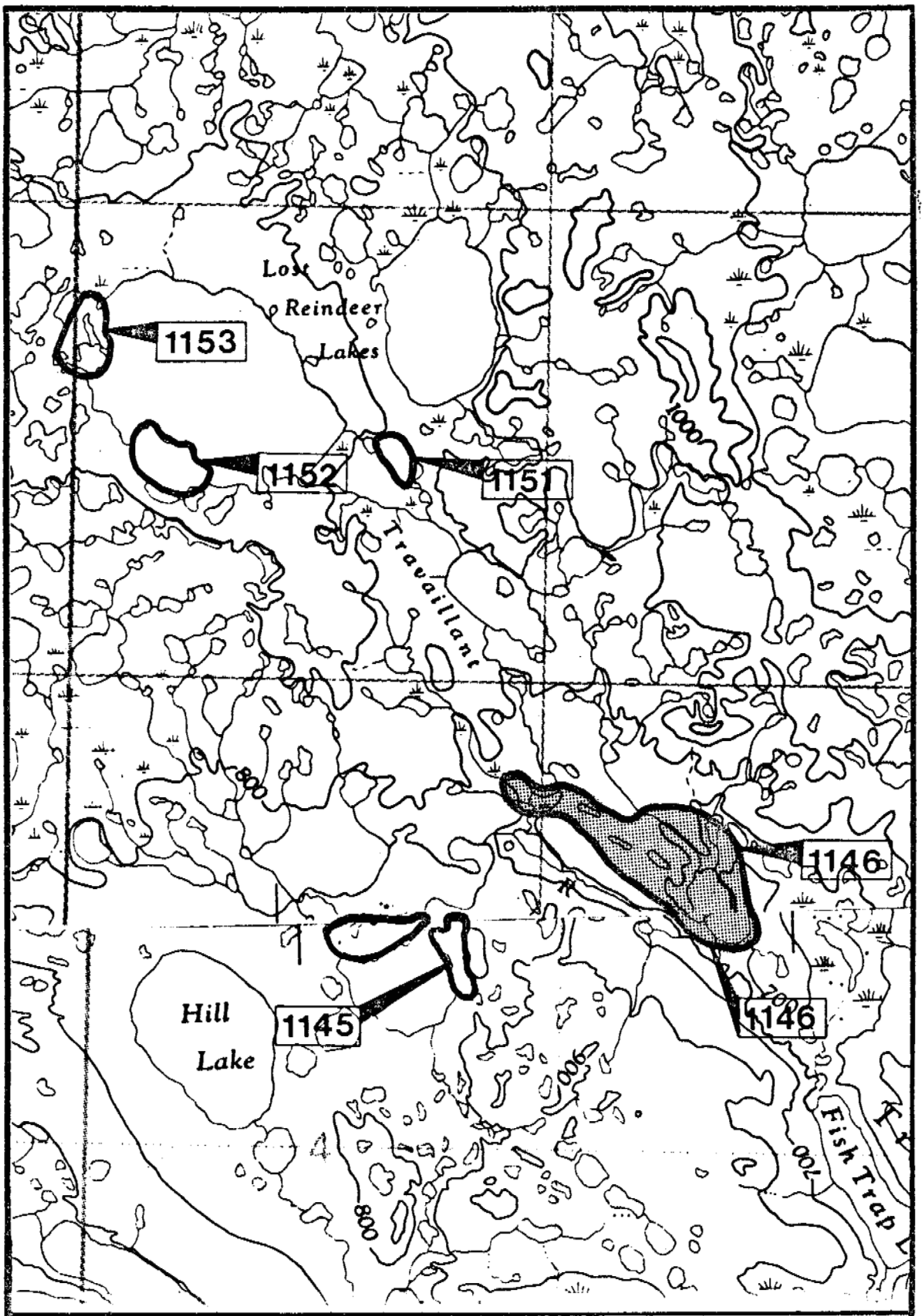


□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A22935-195 SCALE: 1" = 3000' (approx.)

Drainage: The high areas of the site are well drained, but the lower areas are marshy.

Assessment: A large quantity of good quality borrow was encountered at site 1146. Moisture contents in the borrow are within acceptable limits and overburden is generally very thin to negligible, although localized thin peat was encountered. Moderately dense spruce on the site will have to be removed for disposal. Permafrost was encountered just below the surface which may necessitate blasting of the gravel. Access to the site from presently located routes is difficult and haulage distance sufficiently long to render development, under present conditions, unfeasible.



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: ARTIC RED RIVER 106-N
AKLAVIK 107-B

SCALE: 1:125,000

SITE 1146

ENVIRONMENTAL SENSITIVITY INDEX

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	TERRAIN (1) 2 3 4 5 Rating: 5	Formation Stability Ice Content	Flat Land, Terrace, Knoll, Rolling, Outcrop, Ridge, Scarp, Overburden Type & Depth, Wet Site, Dry Site.
5	VEGETATION 1 (2) 3 4 5 Rating: 10	Aesthetic Value Habitat Value	Marsh Black Spruce Muskeg White Spruce Mixed Conifer Conifer - Deciduous Deciduous Dry Slopes Riparian
15	MAMMALS 1 (2) 3 4 5 Rating: 30	Ungulates Furbearers Carnivores Small Mammals	Winter Range, Summer Range, Migration Route, Denning Area, Dams and Lodges, Special Habitat Use.
10	BIRDS 1 (2) 3 4 5 Rating: 20	Waterfowl-Swans, Geese, Ducks Game Birds Raptors Shorebirds Passerine	Migration Pathway, Moulting, Spring Staging, Fall Staging, Nesting-Brooding, Perching, Winter Habitat.
10	FISHERY 1 2 3 (4) 5 Rating: 40	Lakes, Tributaries Mackenzie River: Whitefish, Smelt Grayling, Sculpin Pike, Goldeye Trout-Perch, Chub Lake Trout, Dace Burbot, Walleye Suckers, Char Stickleback, Cisco	Spawning, Nursery, Feeding, Overwintering. Major Migration Route. Siltation of Spawning Areas, Benthic Communities. Toxic Material Spill. Slumps, Velocity Increments, Migration Barriers. Eutrophication. Blasting.

R.I.R. - Relative Importance Units - Base of 100 units.

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	ARCHAEOLOGY 1 2 (3) 4 5 Rating: 15	Paleontology Pre-Historic Historic	Probability of Discovery. Low, Medium, High. Known Sites.
10	AESTHETICS (1) 2 3 4 5 Rating: 10	Visible from: Physical Disturbance	River, Highway, Air. Dust, Waste, Stockpiles. Noises.
15	RESOURCE UTILIZATION 1 2 (3) 4 5 Rating: 45	Fort Good Hope Arctic Red R. Inuvik	Improved Access. Traplines. Hunting. Fishing. Domestic. Commercial.
15	ASSOCIATED DISTURBANCES 1 2 3 4 (5) Rating: 75	Access Roads Miles From Highway Miles From Pipeline Hydrologic Alterations Continued Use For Maintenance.	0-2, 2-5, 5-10, 10+ 0-2, 2-5, 5-10, 10+ Cuts and Fills. Creek Crossings. Compaction, Slumping, Erosion. Stockpiles, Waste, Dust.
10	RESTORATION 1 (2) 3 4 5 Rating: 20	Soil Stabilization Visual Improvement Habitat Replacement	Natural Regeneration. Grass-Legume Seeding. Transplants. Sustained Maintenance. Erosion Control Systems.

NOTE: SENSITIVITY INDEX RANGE

MINIMAL SENSITIVITY		MAXIMUM SENSITIVITY
100	TO	500

TOTAL INDEX: 270

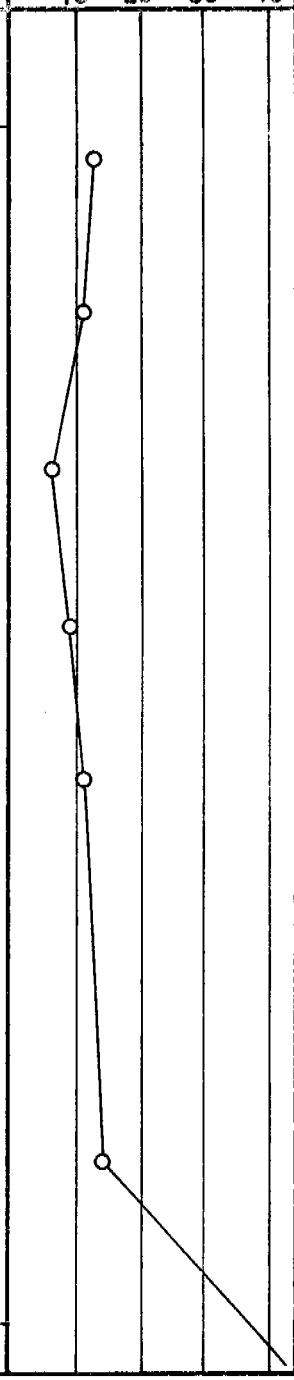
SPECIAL CONCERNS: Straddles upper Travaillant River. Fish migration passage should be insured.

F.F. SLANEY & COMPANY LIMITED
VANCOUVER, B. C.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1146 HOLE NO. 1 PAGE 1 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION
1	Pt	PEAT: -fibrous & woody, brown	NOT FROZEN
2, 3, 4	GW	GRAVEL, sandy some silt, well graded, average ½" angular, light to medium brown.	FROZEN
5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17	SM	SAND, gravelly -trace of silt, coarse subangular sand, fine angular and subangular gravel, average 3/8", light to medium brown. (4' - 10') 32% GRAVEL 52% SAND 16% SILT & CLAY -less gravelly, sand is medium to coarse grained, sand and gravel is subangular to subrounded.	



DATE DRILLED: Sep. 12/73 | LOGGED BY: EBA 105-1 | COMPLETION DEPTH: 27.0'

DRILLING METHOD: CONVENTIONAL AIR | THAW DEPTH: 1.5'

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1146 HOLE NO. 1 PAGE 2 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
	SM	SAND: some gravel			
18		SILT, clayey, sandy	V= 35%		18
19	ML	-fine to medium fine grained sand, brown-grey			19
20			V= 20%	245	20
21					21
			V=10-20 %		
22					22
			V=5-10%		
23					23
24					24
25					25
26				91	26
27					27
		END OF HOLE			
28					28
29					29
30					30
31					31
32					32
33					33
34					34

DATE DRILLED: Sep. 12/73 LOGGED BY: EBA 105-1 COMPLETION DEPTH: 27.0'

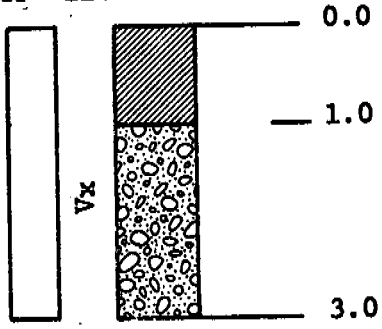
DRILLING METHOD: CONVENTIONAL AIR THAW DEPTH: 1.5'

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

TEST PIT LOG

TP 1146-1

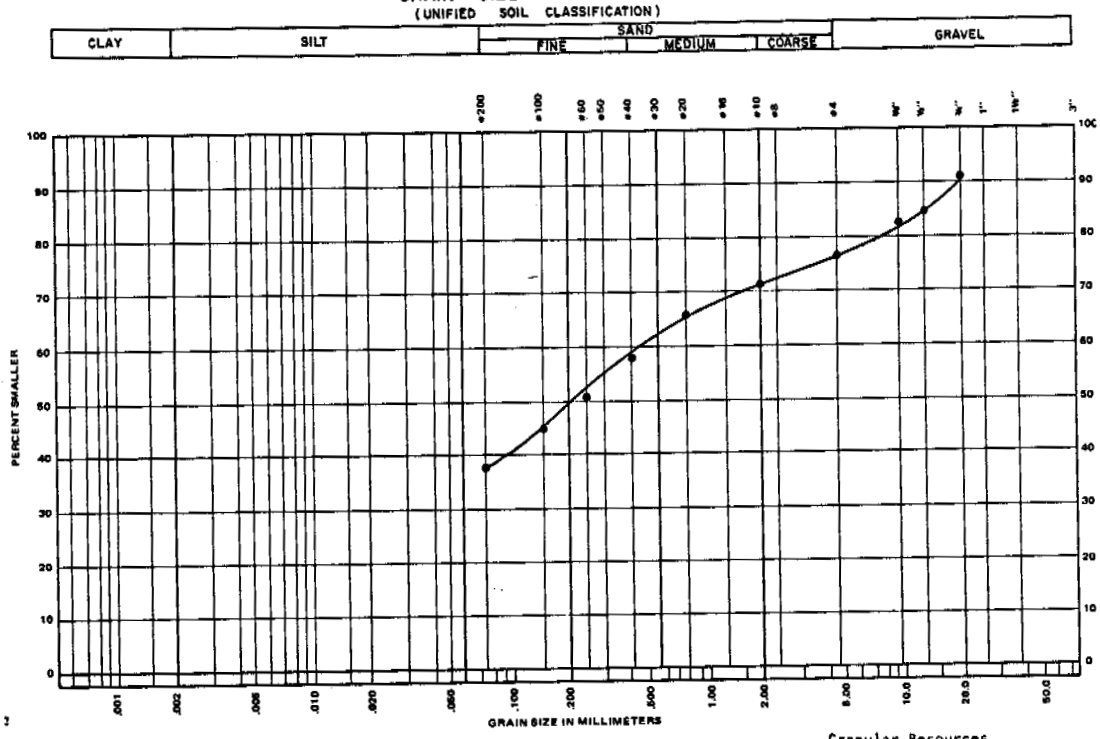


Peat

Gravel, with a lot of organics
high ice content

23% GRAVEL
39% SAND
38% SILT & CLAY

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

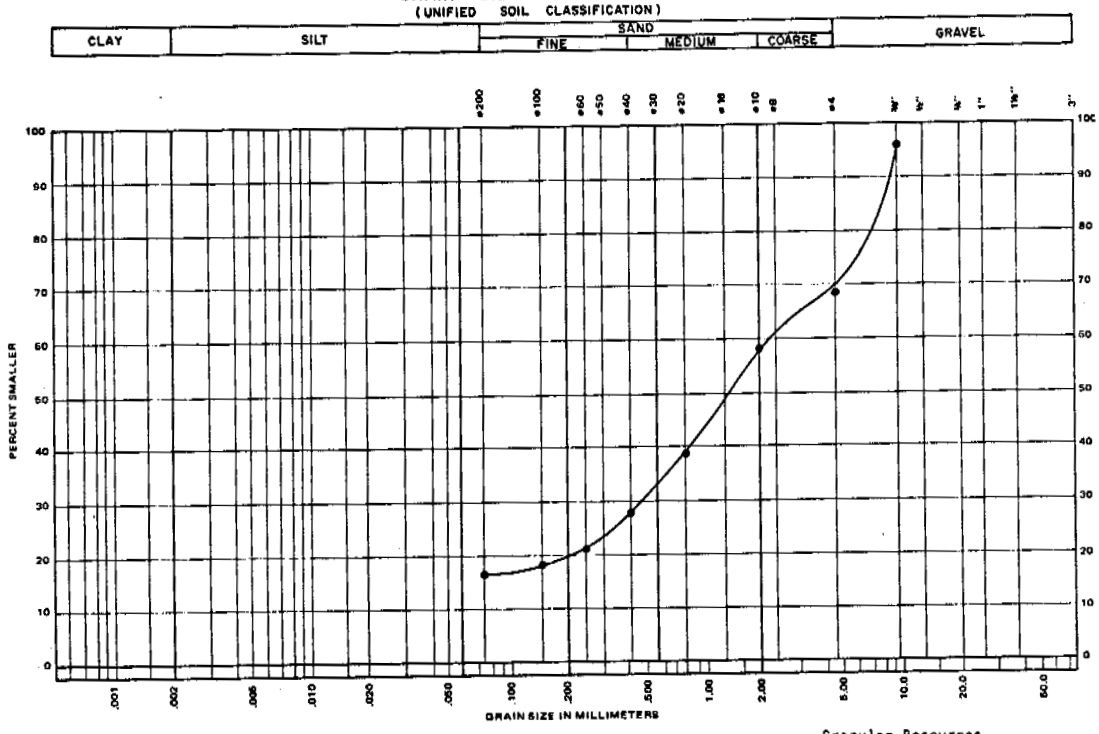


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Sandy, gravelly silt
M/C = 6.2% (SM)

PROJECT Granular Resources
JOB No. E-666 DATE Nov. /73
SAMPLE No. TP 1146-1
DEPTH 3'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



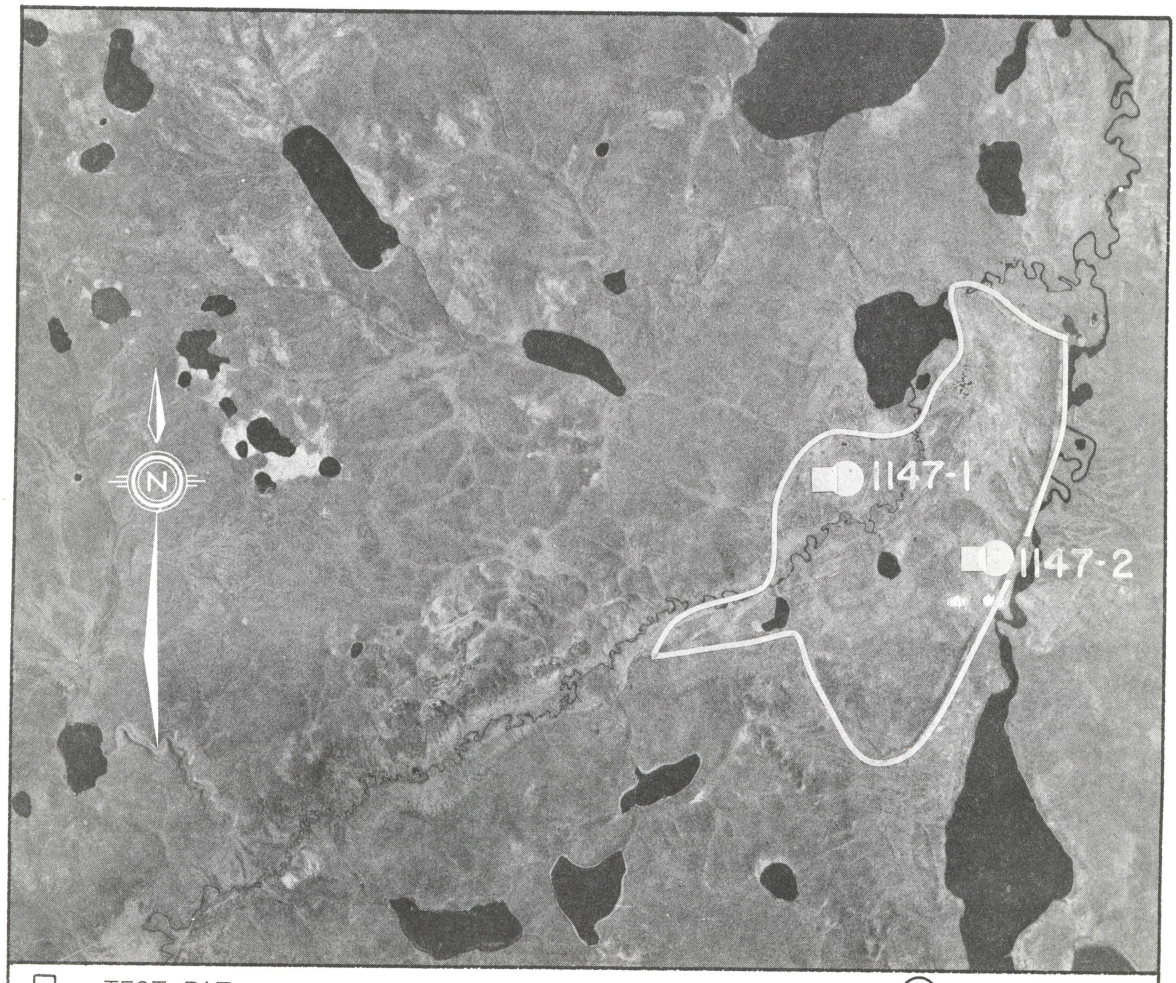
EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Sand and Gravel
with Some Silt (SM)

PROJECT Granular Resources
JOB No. E-666 DATE Oct 10/73
SAMPLE No. BH 1146-1
DEPTH 4' - 10'

SITE 1147

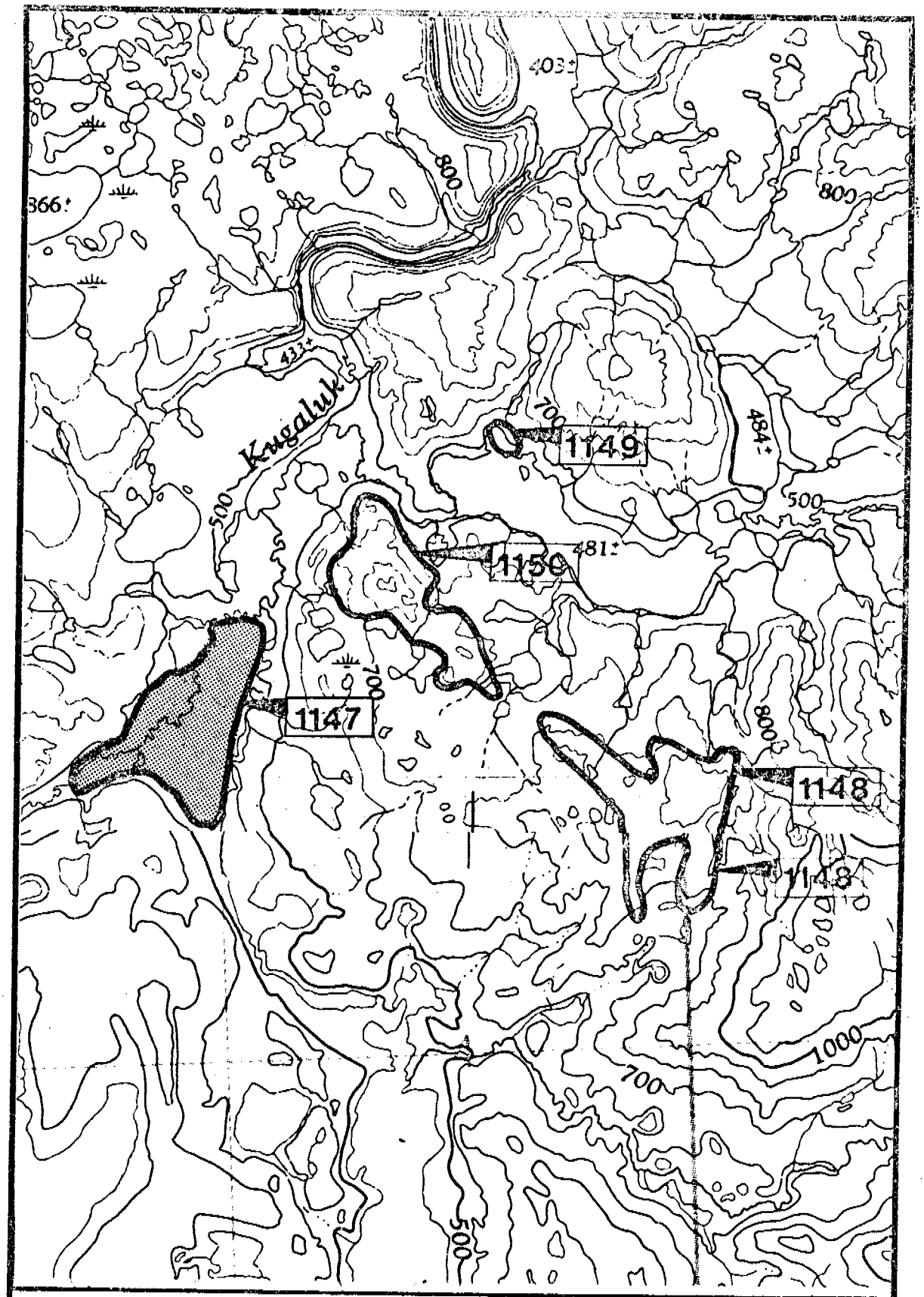
Location:	Site 1147 is situated 16 miles NW of Tenlen Lake. Proposed highway and pipeline routes are 29 and 37 miles south of the site respectively.
Geology:	Site 1147 is a large outwash deposit.
Material:	Gravel and sand, some silt, sand content variable, grading variable.
Volume:	16,000,000 cu. yd. volume estimate seems reliable.
Area:	850 acres.
Drainage:	The site is well drained.



□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A21583-87 SCALE: 1" = 5500' (approx.)

Assessment: A large volume of fair and good quality borrow is present at site 1147. Moisture contents of some of the material are above acceptable limits which will necessitate stockpiling and draining before use. Overburden consisting of approximately 2 feet of peat and silt will have to be stripped and stockpiled for use in restoration. Tree and brush cover varies from spare to dense. Permafrost was encountered at a depth of 6 feet. Frozen gravel below this depth will have to be blasted before it can be excavated. Access to the site is difficult because of rolling, thermally sensitive terrain. Haulage distance to proposed highway and pipeline routes is excessively long.



SITE LIMITS

- - - - - PROPOSED GAS PIPELINE

——— PROPOSED MACKENZIE HIGHWAY

MAPS: TRAVAILLANT LAKE 106-O
CROSSLEY LAKES 107-A

SCALE: 1:125,000

SITE **1147**

ENVIRONMENTAL SENSITIVITY INDEX

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	TERRAIN (1) 2 3 4 5 Rating: 5	Formation Stability Ice Content	Flat Land, Terrace, Knoll, Rolling, Outcrop, Ridge, Scarp, Overburden Type & Depth, Wet Site, Dry Site.
5	VEGETATION 1 (2) 3 4 5 Rating: 10	Aesthetic Value Habitat Value	Marsh Black Spruce Muskeg White Spruce Mixed Conifer Conifer - Deciduous Deciduous Dry Slopes Riparian
15	MAMMALS 1 (2) 3 4 5 Rating: 30	Ungulates Furbearers Carnivores Small Mammals	Winter Range, Summer Range, Migration Route, Denning Area, Dams and Lodges, Special Habitat Use.
10	BIRDS 1 (2) 3 4 5 Rating: 20	Waterfowl-Swans, Geese, Ducks Game Birds Raptors Shorebirds Passerine	Migration Pathway, Moulting, Spring Staging, Fall Staging, Nesting-Brooding, Perching, Winter Habitat.
10	FISHERY 1 2 (3) 4 5 Rating: 30	Lakes, Tributaries Mackenzie River: Whitefish, Smelt Grayling, Sculpin Pike, Goldeye Trout-Perch, Chub Lake Trout, Dace Burbot, Walleye Suckers, Char Stickleback, Cisco	Spawning, Nursery, Feeding, Overwintering. Major Migration Route. Siltation of Spawning Areas, Benthic Communities. Toxic Material Spill. Slumps, Velocity Increments. Migration Barriers. Eutrophication. Blasting.
5	ARCHAEOLOGY (1) 2 3 4 5 Rating: 5	Paleontology Pre-Historic Historic	Probability of Discovery. Low, Medium, High. Known Sites.
10	AESTHETICS (1) 2 3 4 5 Rating: 10	Visible from: Physical Disturbance	River, Highway, Air. Dust, Waste, Stockpiles, Noises.
15	RESOURCE UTILIZATION (1) 2 3 4 5 Rating: 15	Fort Good Hope Arctic Red R. Inuvik	Improved Access. Traplines. Hunting, Fishing, Domestic, Commercial.
15	ASSOCIATED DISTURBANCES 1 2 3 4 (5) Rating: 75	Access Roads Miles From Highway Miles From Pipeline Hydrologic Alterations Continued Use For Maintenance.	0-2, 2-5, 5-10, 10+ 0-2, 2-5, 5-10, 10+ Cuts and Fills, Creek Crossings, Compaction, Slumping, Erosion. Stockpiles, Waste, Dust.
10	RESTORATION (1) 2 3 4 5 Rating: 10	Soil Stabilization Visual Improvement Habitat Replacement	Natural Regeneration. Grass-Legume Seeding. Transplants. Sustained Maintenance. Erosion Control Systems.

R.I.R. - Relative Importance Units - Base of 100 units.

NOTE: SENSITIVITY INDEX RANGE

MINIMAL SENSITIVITY		MAXIMUM SENSITIVITY
100	TO	500

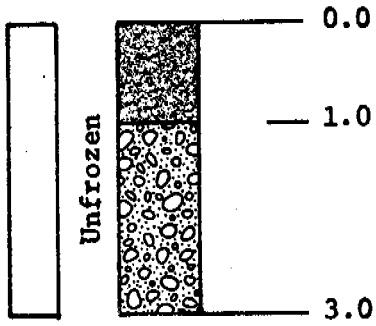
TOTAL INDEX: 210

SPECIAL CONCERNS: Straddles Kugaluk River. Provision of fish migration passage is recommended. Within Barren-Ground Caribou winter range.

F.F. SLANEY & COMPANY LIMITED
VANCOUVER, B. C.

TEST PIT LOG

TP 1147-1

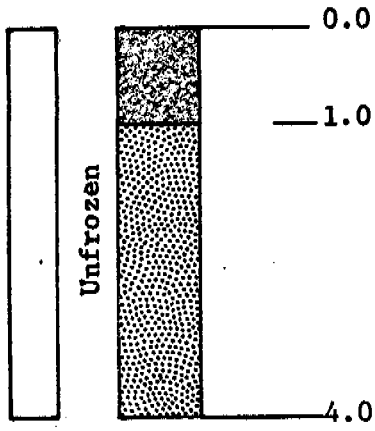


Peat

Gravel, sandy
light brown
dry

54% GRAVEL
36% SAND
10% SILT

TP 1147-2



Peat

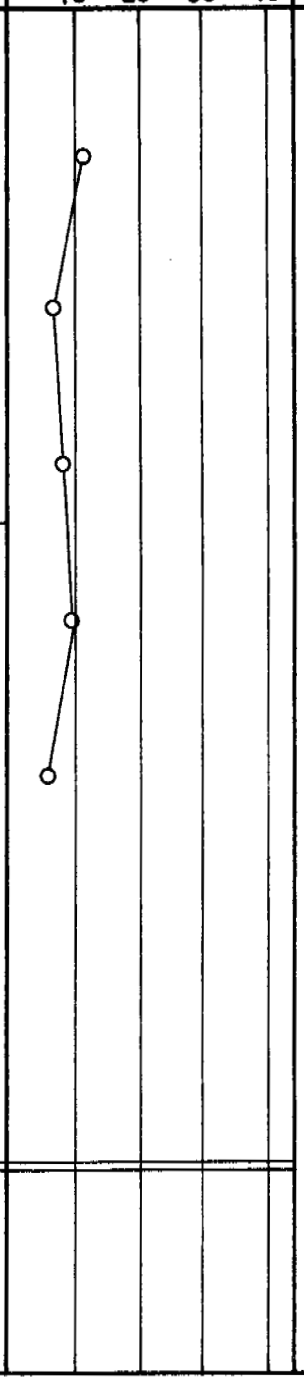
Sand, clear
moist
looks poorly graded

5% GRAVEL
67% SAND
26% SILT & CLAY

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1147 HOLE NO. 1 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION
	Pt	PEAT	
1		-silty, medium to dark brown	NOT FROZEN
	ML	SILT-sandy, some coarse gravel, some cobbles, dry	
2		GRAVEL	
3		-sandy, silty, subangular to subrounded, average ½", maximum 1¼", dry; light brown	
4		-less silt, some silt	
5		-very sandy, medium grained coarse	
6		7.1% O.C. (4' - 10') 51% GRAVEL 35% SAND 13% SILT & CLAY	
7		-gravel maximum 1½" - 2", average ½" - 3/4", sand well graded, wet, light brown	FROZEN
8	GP-GM		
9		-maximum 2", average 3/4". well graded	
10		-gravel finer, maximum 1", averge ½", sand predominantly coarse, some medium grained, trace to some silt, wet.	
11			
12			
13			
14			
15			
		END OF HOLE	
16			
17			



DEPTH (feet): 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

DATE DRILLED: Sep.4/73

LOGGED BY: EBA 112-1

COMPLETION DEPTH: 15.0'

DRILLING METHOD: AUGER

THAW DEPTH: 6.8'

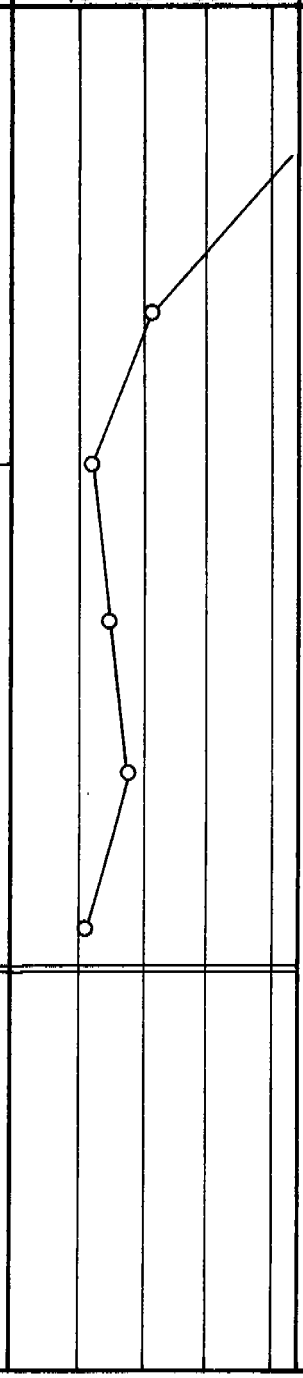
GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1147 HOLE NO. 2 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION
1	PT-OL	PEAT & ORGANIC SILT -fibrous, dark brown (thickness as low as ½" on some areas of site)	NOT FROZEN
2–12	SM	SAND -silty to some silt, trace to some fine gravel, maximum ½", sand fine and medium grained, moist, light brown -8.8% O. C. (8'+10'+12') 15% GRAVEL 66% SAND 17% SILT & CLAY	FROZEN
12–13	SC-ML	-silty, some clay, trace fine gravel, fine and medium sand, low plasticity, wet, grey-brown	
13		END OF HOLE	



DEPTH (feet): 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

DATE DRILLED: Sep. 13/73

LOGGED BY: EBA 112-2

COMPLETION DEPTH: 12.5'

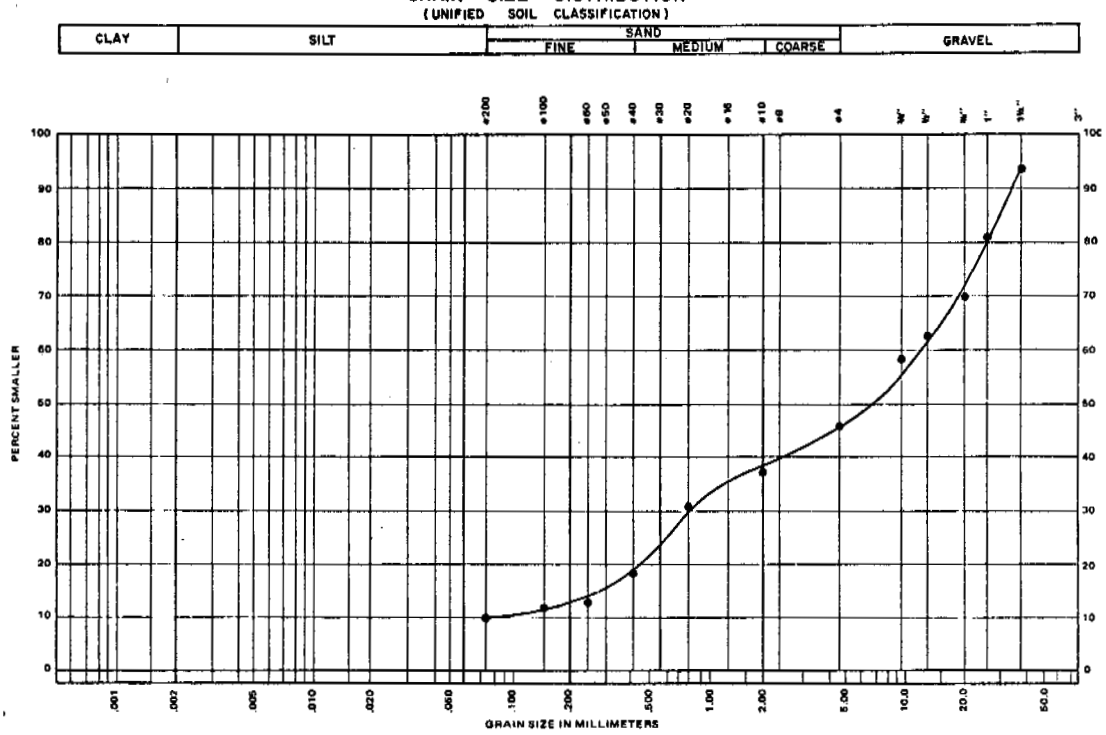
DRILLING METHOD: AUGER

THAW DEPTH: 6.0'

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

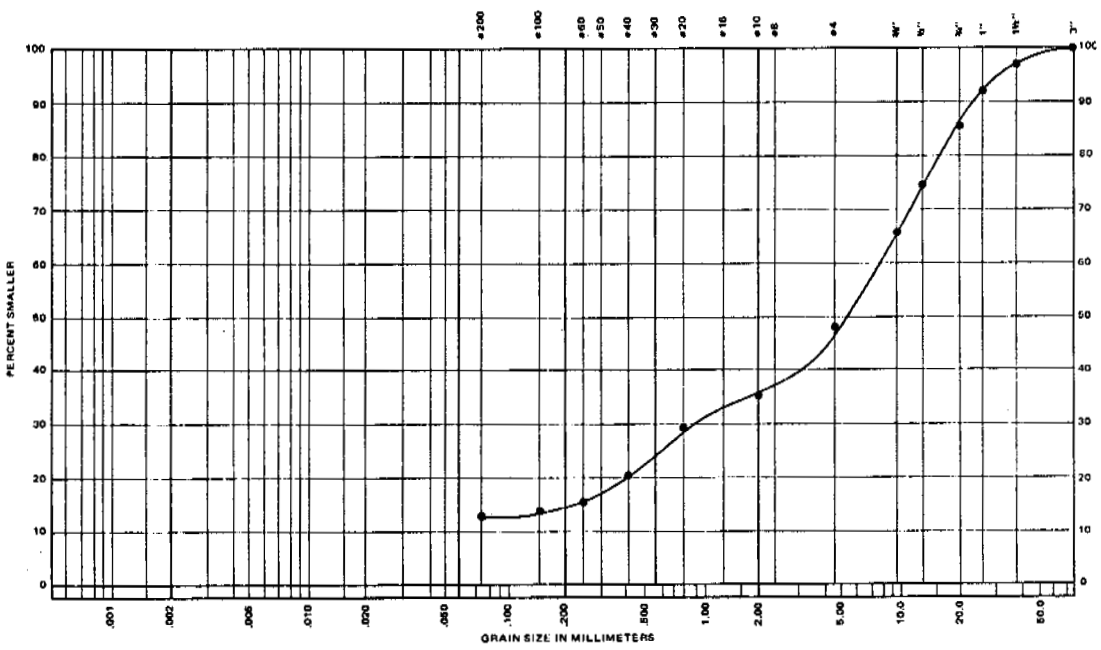


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Gravel and Sand and Some Silt (GP-GM) M/C = 7.7%

PROJECT Granular Resources
JOB No. E-666 DATE Nov. 29/73
SAMPLE No. TP 1147-1
DEPTH 3'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

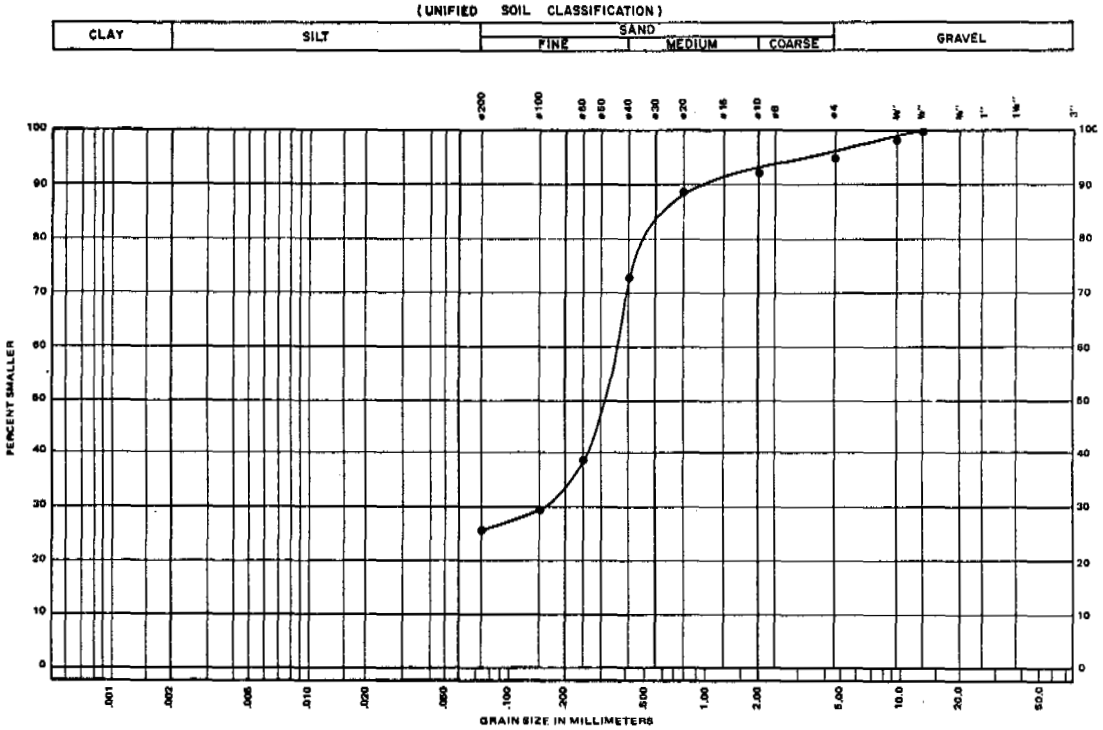


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Gravel and Sand and Some Silt (GP-GM)

PROJECT Granular Resources
JOB No. E-666 DATE Dec. 17/73
SAMPLE No. BH 1147-1
DEPTH 4' - 10'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

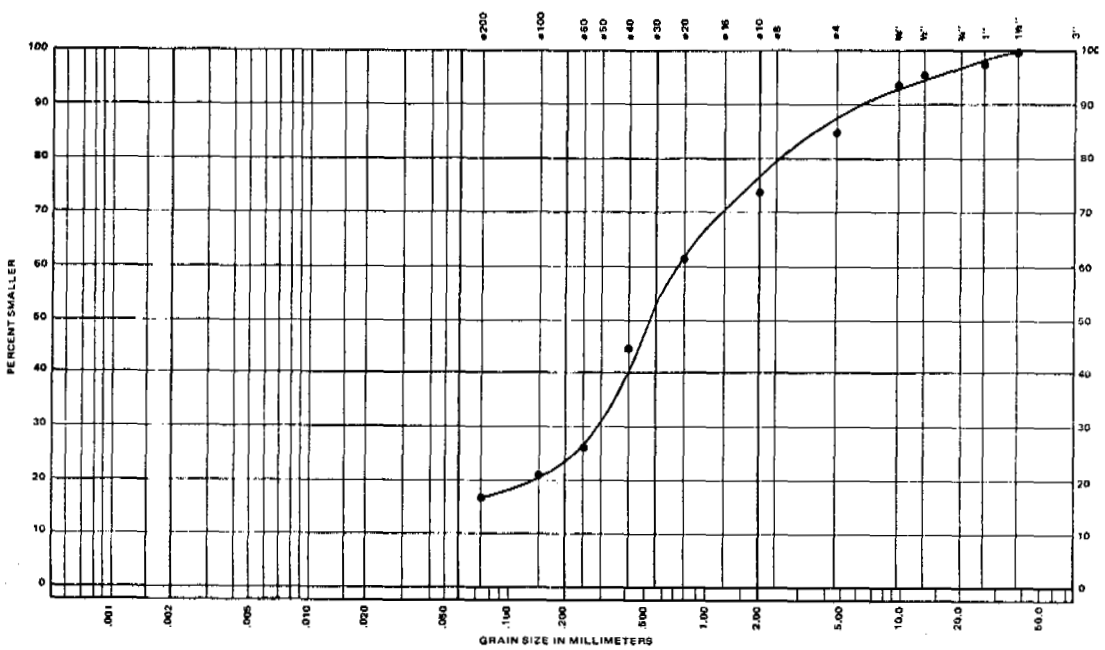


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Silty Sand With A Trace of Gravel (SM) M/C = 14.7%

PROJECT Granular Resources
JOB No. E-666 DATE Nov. 29/73
SAMPLE No. TP 1147-2
DEPTH 4'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Sand and Some Gravel and Silt (SM)

PROJECT Granular Resources
JOB No. E-666 DATE Dec. 17/73
SAMPLE No. BH 1147-2
DEPTH 8' + 10' + 12'

SITE 1148

Location: Site 1148 is located 15 miles NW of Tenlen Lake. The proposed pipeline and highway routes are 37 and 29 miles south of the site respectively.

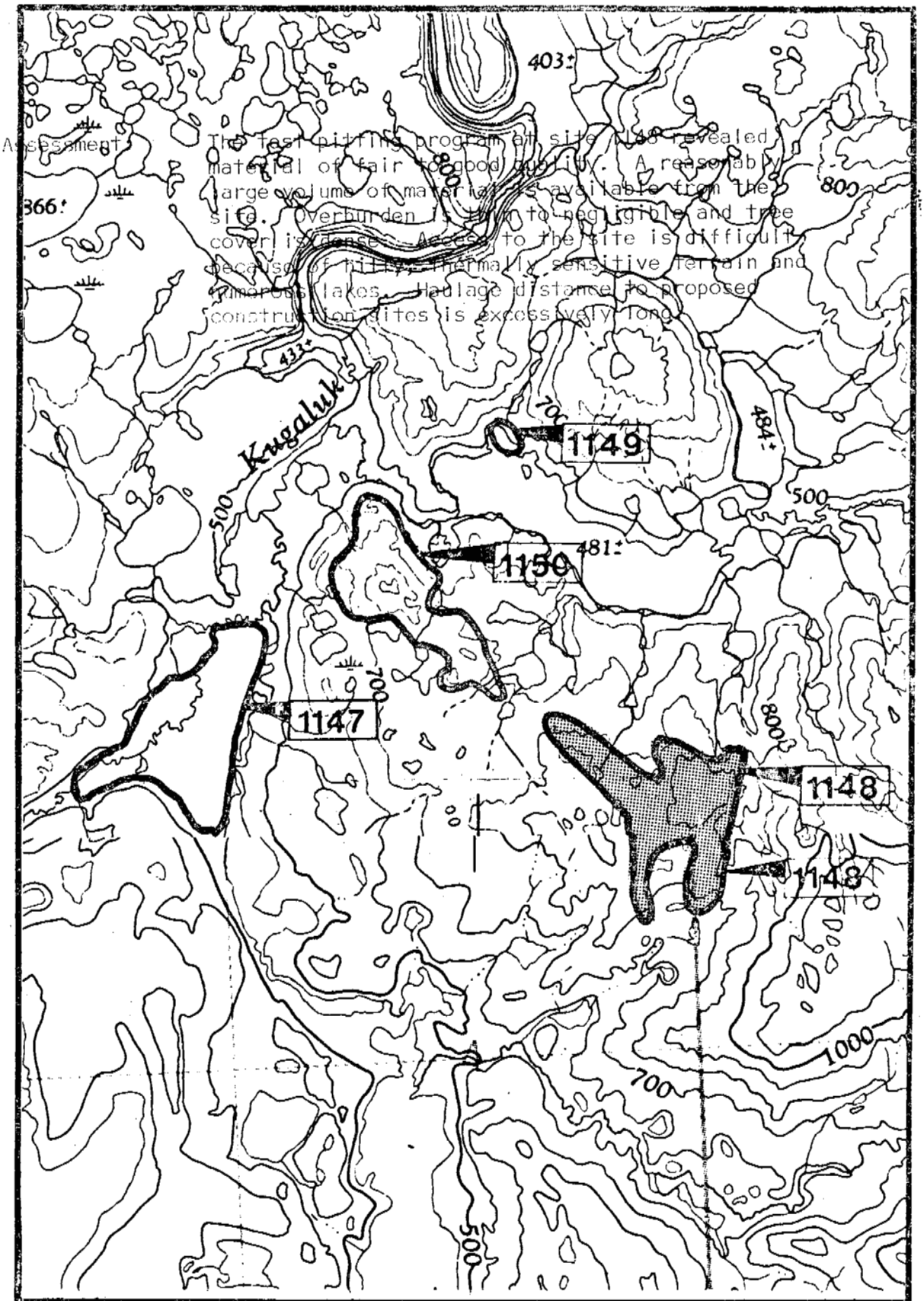
Geology: The material at site 1148 is contained in small, relatively thin outwash remnants.

Material: Gravel and sand and silt, numerous cobbles.

□ TEST PIT ○ BOREHOLE

AIRPHOTO No. 21583-85 SCALE: 1" = 5500' (approx.)

Assessment: The test pitting program at site 1148 revealed material of fair to good quality. A reasonably large volume of material is available from the site. Overburden is thin to negligible and tree cover is dense. Access to the site is difficult because of hilly, thermally sensitive terrain and numerous lakes. Haulage distance to proposed construction sites is excessively long.



Assessment: The test pitting program at site 1148 revealed material of fair to good quality. A reasonably large volume of material is available from the site. Overburden is thin to negligible and tree cover is dense. Access to the site is difficult because of hilly, thermally sensitive terrain and numerous lakes. Haulage distance to proposed construction sites is excessively long.

SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: TRAVAILLANT LAKE 106-O
CROSSLEY LAKES 107-A

SCALE: 1:125,000

SITE 1148

ENVIRONMENTAL SENSITIVITY INDEX

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	TERRAIN 1 (2) 3 4 5 Rating: 10	Formation Stability Ice Content	Flat Land, Terrace, Knoll, Rolling, Outcrop, Ridge, Scarp, Overburden Type & Depth, Wet Site, Dry Site.
5	VEGETATION (1) 2 3 4 5 Rating: 5	Aesthetic Value Habitat Value	Marsh Black Spruce Muskeg White Spruce Mixed Conifer Conifer - Deciduous Deciduous Dry Slopes Riparian
15	MAMMALS 1 2 (3) 4 5 Rating: 45	Ungulates Furbearers Carnivores Small Mammals	Winter Range, Summer Range, Migration Route, Denning Area, Dams and Lodges, Special Habitat Use.
10	BIRDS (1) 2 3 4 5 Rating: 10	Waterfowl-Swans, Geese, Ducks Game Birds Raptors Shorebirds Passerine	Migration Pathway, Moulting, Spring Staging, Fall Staging, Nesting-Brooding, Perching, Winter Habitat.
10	FISHERY 1 2 (3) 4 5 Rating: 30	Lakes, Tributaries Mackenzie River: Whitefish — Smelt Grayling — Sculpin Pike — Goldeye Trout-Perch — Chub Lake Trout — Dace Burbot — Walleye Suckers — Char Stickleback — Cisco	Spawning, Nursery, Feeding, Overwintering. Major Migration Route. Siltation of Spawning Areas, Benthic Communities. Toxic Material Spill. Slumps, Velocity Increments, Migration Barriers. Eutrophication. Blasting.

R.I.R. - Relative Importance Units - Base of 100 units.

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	ARCHAEOLOGY 1 2 (3) 4 5 Rating: 15	Paleontology Pre-Historic Historic	Probability of Discovery. Low, Medium, High. Known Sites.
10	AESTHETICS (1) 2 3 4 5 Rating: 10	Visible from: Physical Disturbance	River, Highway, Air. Dust, Waste, Stockpiles. Noises.
15	RESOURCE UTILIZATION 1 2 (3) 4 5 Rating: 45	Fort Good Hope Arctic Red R. Inuvik	Improved Access. Traplines. Hunting. Fishing. Domestic. Commercial.
15	ASSOCIATED DISTURBANCES 1 2 3 4 (5) 75 Rating:	Access Roads Miles From Highway Miles From Pipeline Hydrologic Alterations Continued Use For Maintenance.	0-2, 2-5, 5-10, 10+ 0-2, 2-5, 5-10, 10+ Cuts and Fills. Creek Crossings. Compaction. Slumping, Erosion. Stockpiles. Waste, Dust.
10	RESTORATION 1 (2) 3 4 5 Rating: 20	Soil Stabilization Visual Improvement Habitat Replacement	Natural Regeneration. Grass-Legume Seeding. Transplants. Sustained Maintenance. Erosion Control Systems.

NOTE: SENSITIVITY INDEX RANGE

MINIMAL SENSITIVITY		MAXIMUM SENSITIVITY
100	TO	500

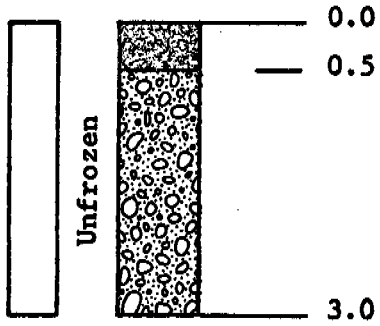
TOTAL INDEX: 265

SPECIAL CONCERNS: Within winter range of Barren-Ground Caribou.
Siltation controls and buffer zones recommended.

F.F. SLANEY & COMPANY LIMITED
VANCOUVER, B. C.

TEST PIT LOG

TP 1148-1

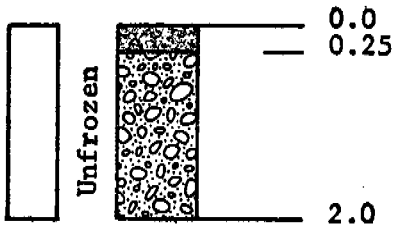


Moss

Gravel, sandy
dry
light brown

38% GRAVEL
30% SAND
32% SILT & CLAY

TP 1148-2

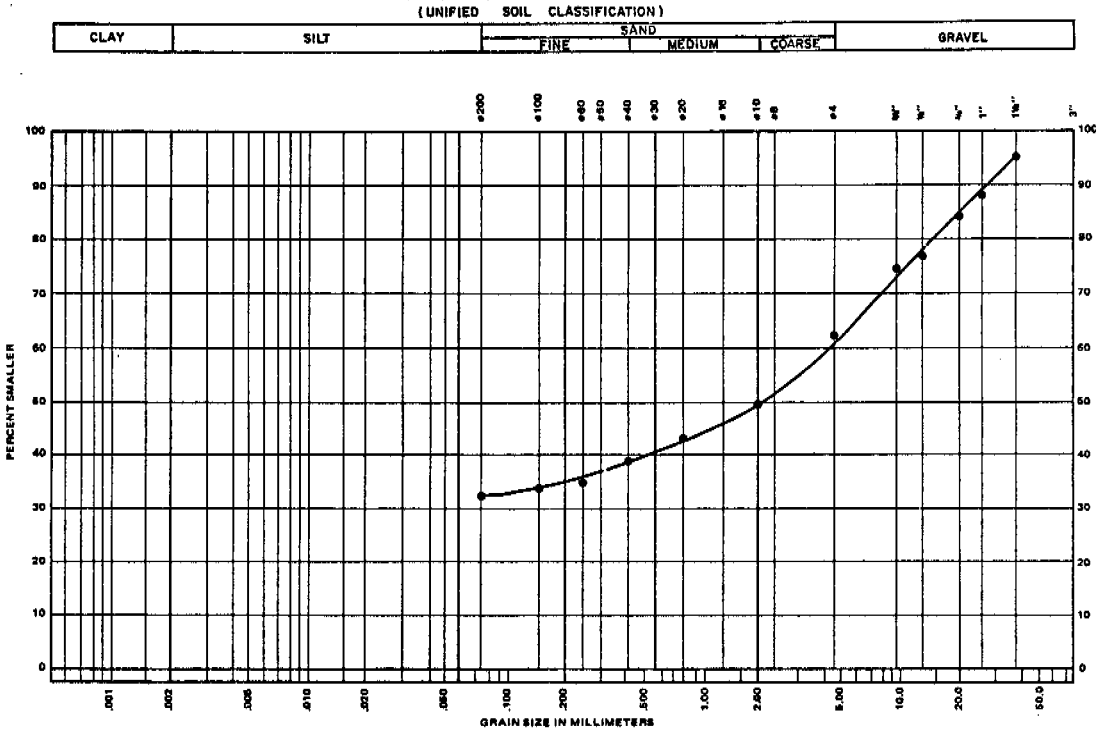


Moss

Gravel, light brown
dry
dense

45% COBBLES
30% GRAVEL
23% SAND
2% SILT & CLAY

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

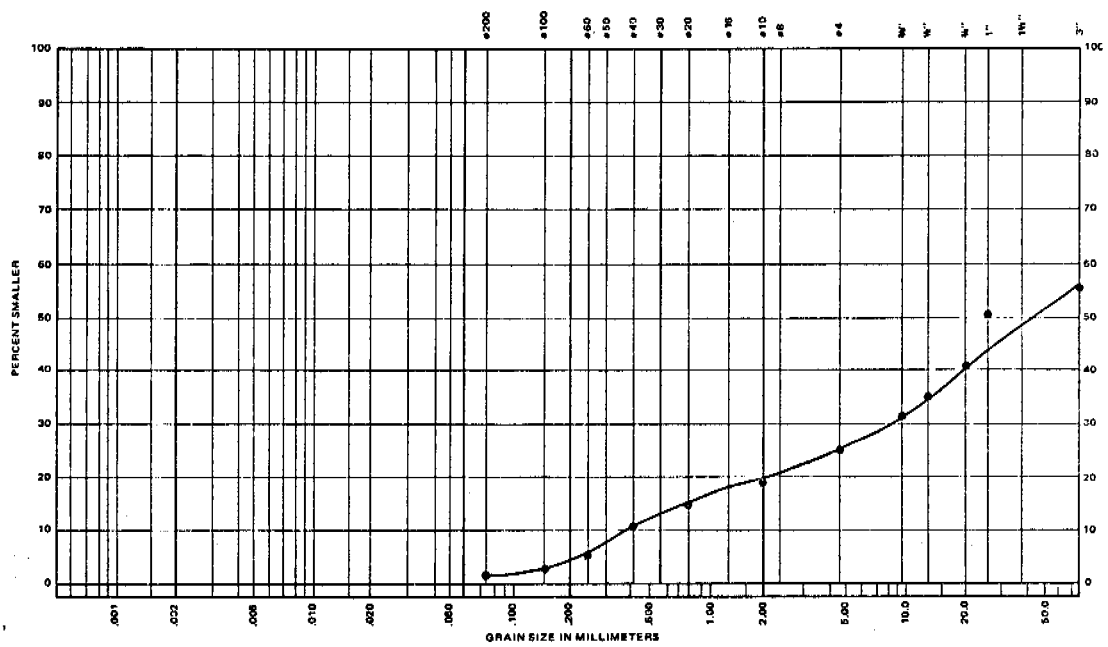


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Gravel and Sand and Silt (GM) M/C = 4.1%

PROJECT Granular Resources
JOB No. E-666 DATE Nov. 29/73
SAMPLE No. TP 1148-1
DEPTH 3'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Gravel and Some Sand and Silt (GP) M/C = 3.3%

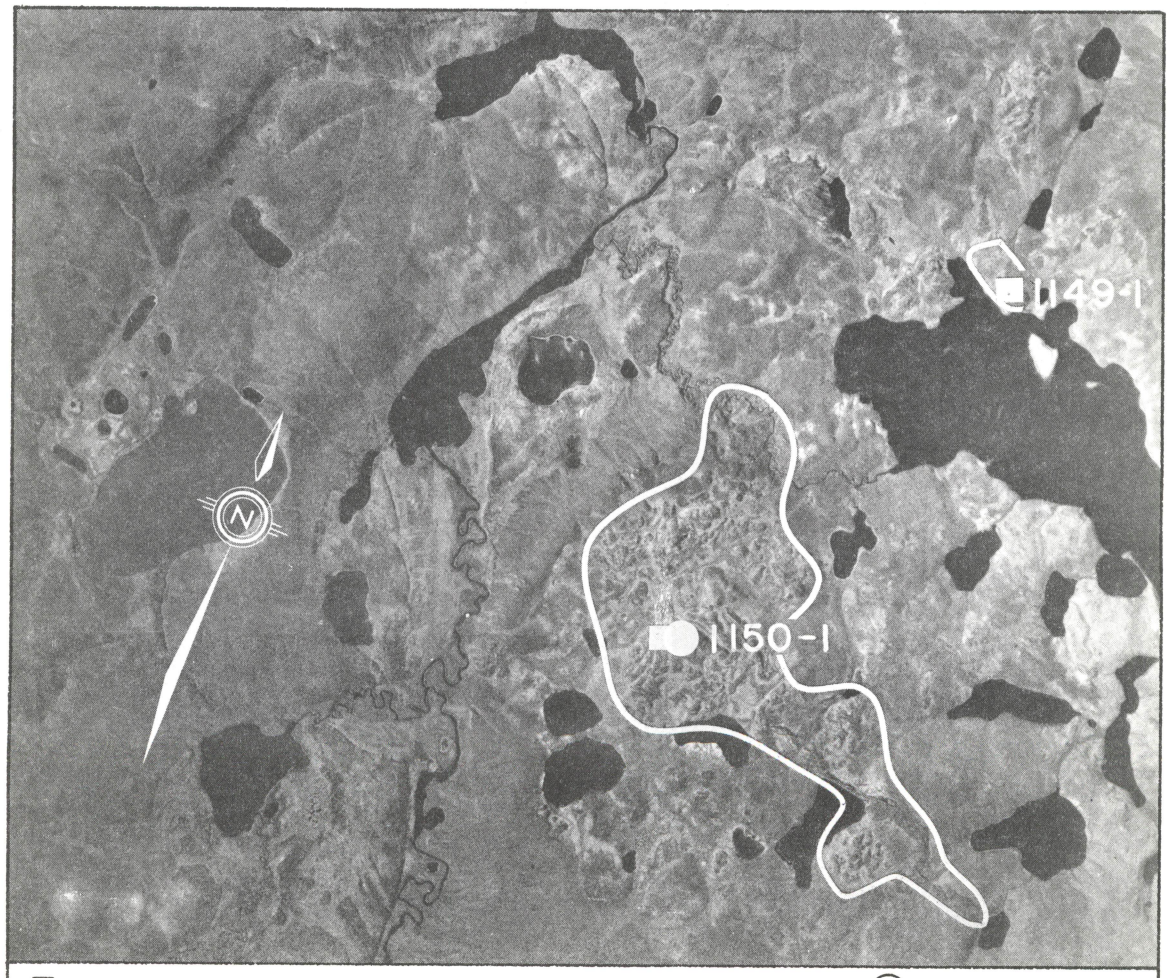
PROJECT Granular Resources
JOB No. E-666 DATE Nov. 29/73
SAMPLE No. TP 1148-2
DEPTH 2'

SITE 1149a

Location: Site 1149 is situated 11 miles SSW of Hyndman Lake. The proposed highway and pipeline routes are 32 and 40 miles south of the site respectively.

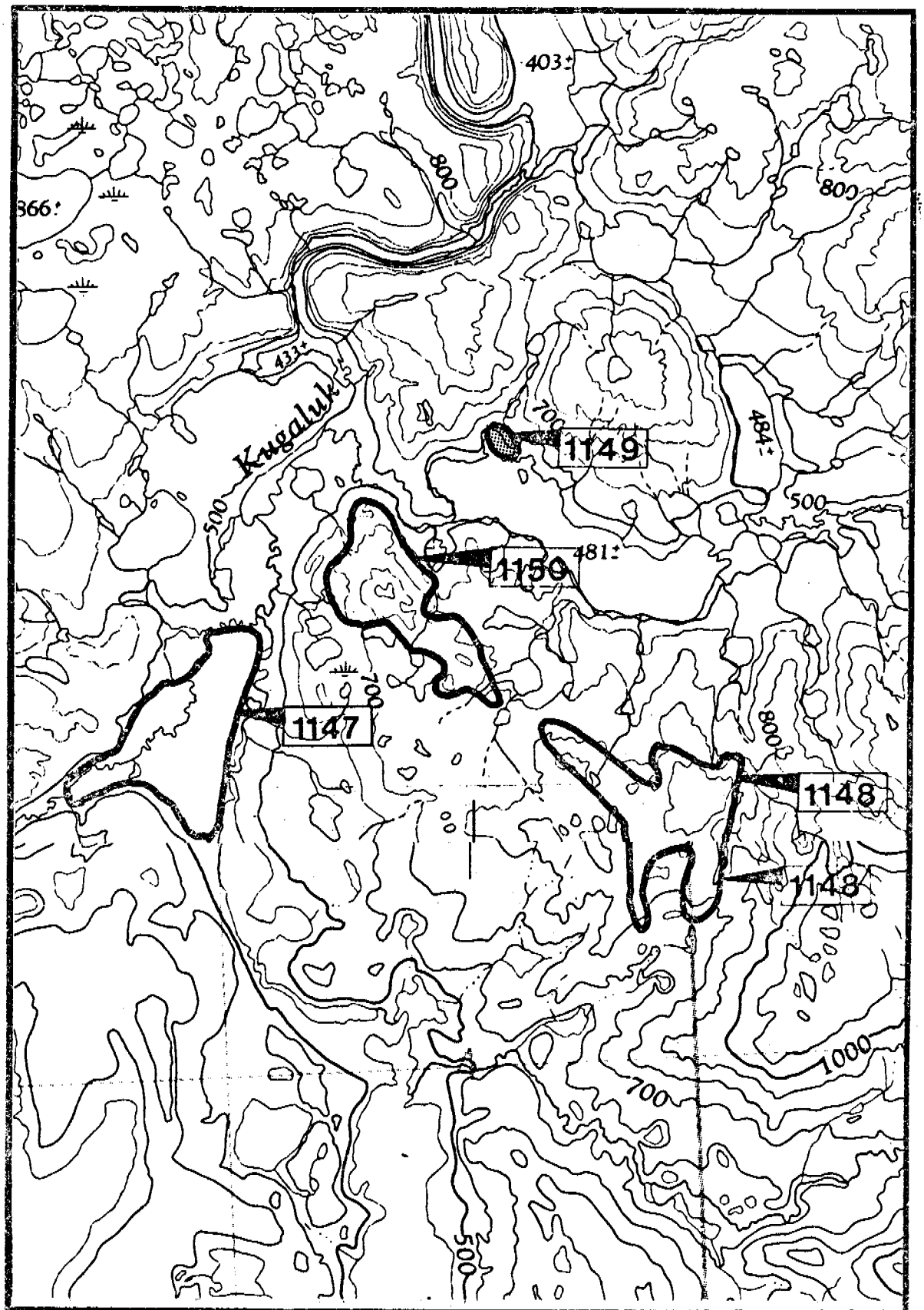
Material: Clay.

Assessment: The material at site 1149 is unsuitable for construction purposes and therefore development of the site is not recommended.



□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A21583-202 SCALE: 1" = 5500' (approx.)



SITE LIMITS

PROPOSED GAS PIPELINE

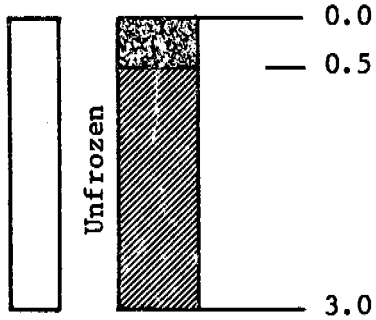
PROPOSED MACKENZIE HIGHWAY

MAPS: TRAVAILLANT LAKE 106-O
CROSSLEY LAKES 107-A

SCALE: 1:125,000

TEST PIT LOG

TP 1149-1



Moss

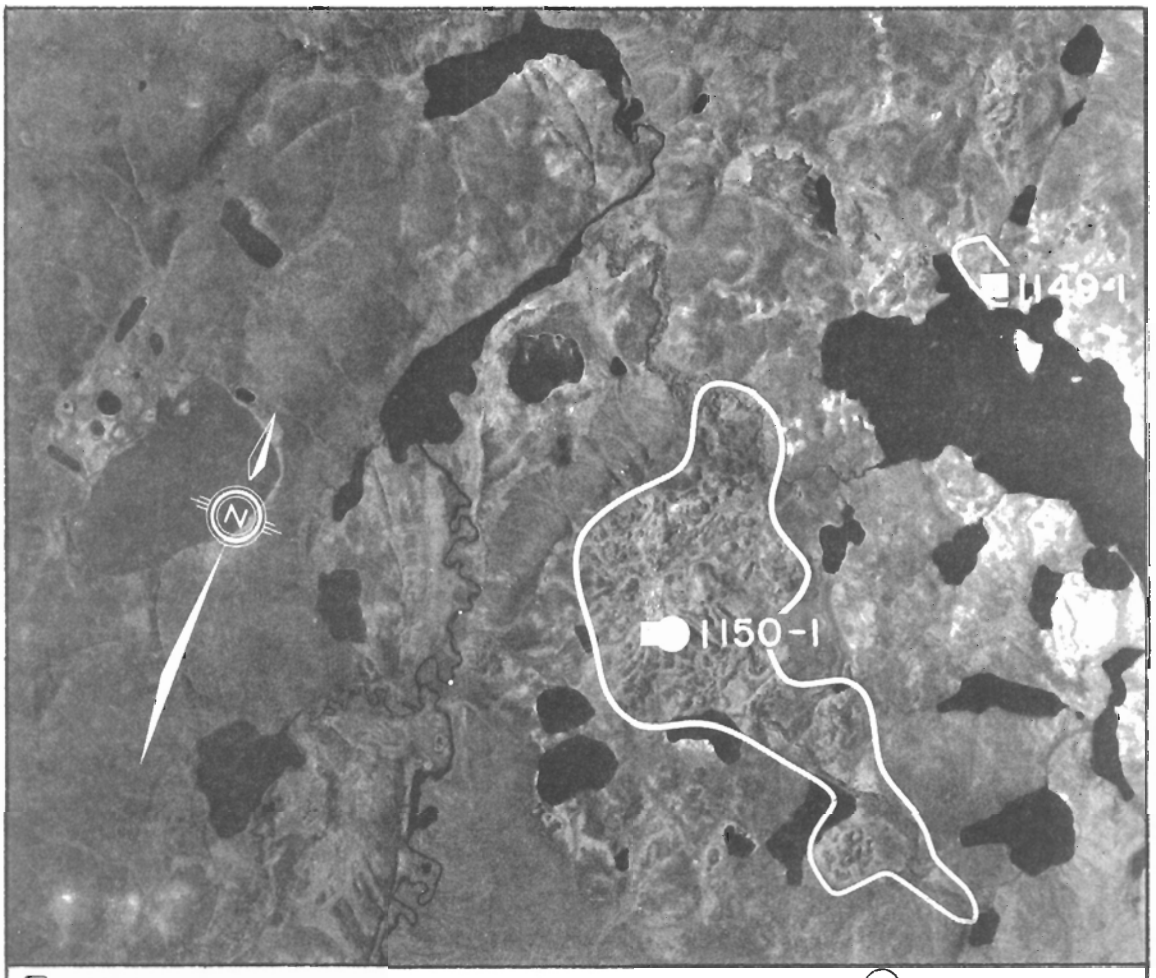
Clay, grey
moist
with cobbles

SITE 1150a

Location: Site 1150 is situated 13 miles NW of Tenlen Lake. Proposed highway and pipeline routes are 26 and 34 miles south of the site respectively.

Geology: The material at site 1150 is contained in an esker-kame complex.

Material: Sand, trace gravel, trace silt, poorly graded.



TEST PIT BOREHOLE

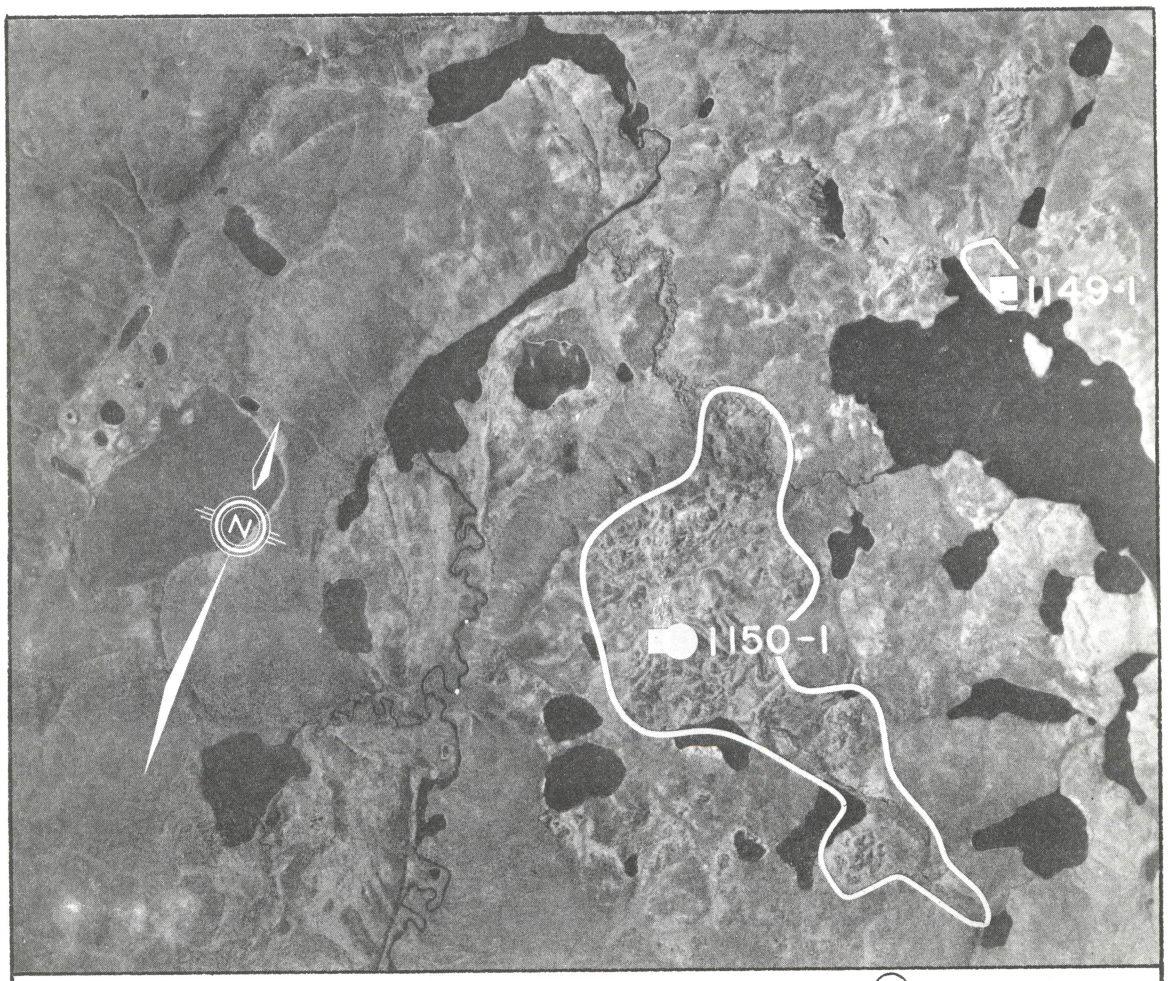
AIRPHOTO No. A21583-202 SCALE: 1" = 5500' (approx.)

SITE 1150a

Location: Site 1150 is situated 13 miles NW of Tenlen Lake. Proposed highway and pipeline routes are 26 and 34 miles south of the site respectively.

Geology: The material at site 1150 is contained in an esker-kame complex.

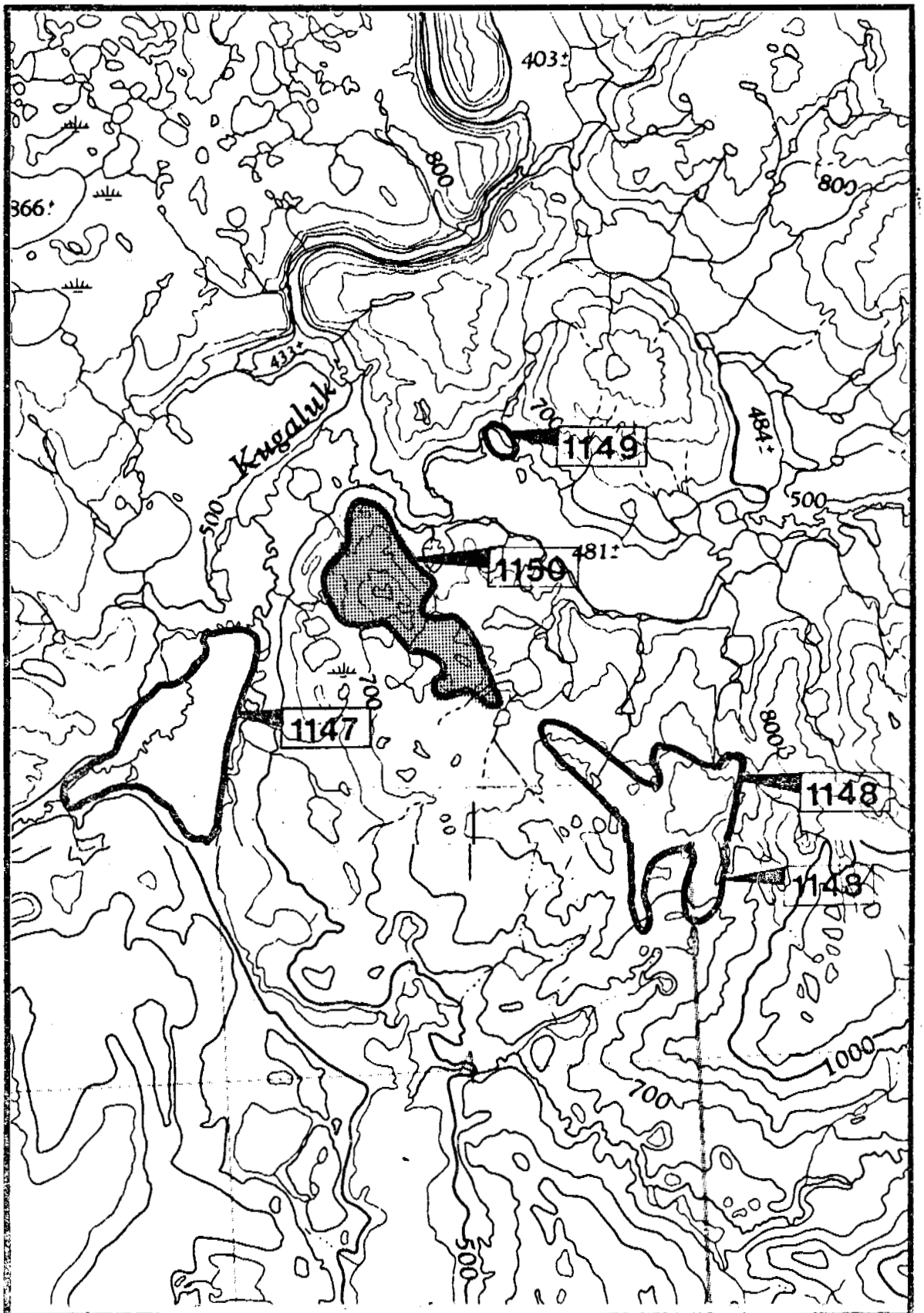
Material: Sand, trace gravel, trace silt, poorly graded.



□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A21583-202 SCALE: 1" = 5500' (approx.)

Assessment: The material is of poor to fair quality and only marginally suitable for construction purposes. Material within the kame-esker complex is probably variable thus more acceptable material may be available. Further drilling would be necessary to better assess the site. The environmental sensitivity rating is low and permafrost depth approximately 6 feet. Access to the site is difficult due to hilly, thermally sensitive terrain and numerous lakes. Haulage distance to the site is excessively long. Site 1150 is not recommended for development.



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: TRAVAILLANT LAKE 106-O
CROSSLEY LAKES 107-A

SCALE: 1:125,000

SITE 1150

ENVIRONMENTAL SENSITIVITY INDEX

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	TERRAIN (1) 2 3 4 5 Rating: 5	Formation Stability Ice Content	Flat Land, Terrace, Knoll, Rolling, Outcrop, Ridge, Scarp, Overburden Type & Depth, Wet Site, Dry Site.
5	VEGETATION 1 (2) 3 4 5 Rating: 10	Aesthetic Value Habitat Value	Marsh Black Spruce Muskeg White Spruce Mixed Conifer Conifer - Deciduous Deciduous Dry Slopes Riparian
15	MAMMALS 1 (2) 3 4 5 Rating: 30	Ungulates Furbearers Carnivores Small Mammals	Winter Range, Summer Range, Migration Route, Denning Area, Dams and Lodges, Special Habitat Use.
10	BIRDS (1) 2 3 4 5 Rating: 10	Waterfowl-Swans, Geese, Ducks Game Birds Raptors Shorebirds Passerine	Migration Pathway, Moulting, Spring Staging, Fall Staging, Nesting-Brooding, Perching, Winter Habitat.
10	FISHERY 1 (2) 3 4 5 Rating: 20	Lakes, Tributaries Mackenzie River: Whitefish / Smelt Grayling / Sculpin Pike / Goldeye Trout-Perch / Chub Lake Trout / Dace Burbot / Walleye Suckers / Char Stickleback / Cisco	Spawning, Nursery, Feeding, Overwintering. Major Migration Route. Siltation of Spawning Areas, Benthic Communities. Toxic Material Spill. Slumps, Velocity Increments. Migration Barriers. Eutrophication. Blasting.

R.I.R. - Relative Importance Units - Base of 100 units.

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	ARCHAEOLOGY (1) 2 3 4 5 Rating: 5	Paleontology Pre-Historic Historic	Probability of Discovery. Low, Medium, High. Known Sites.
10	AESTHETICS (1) 2 3 4 5 Rating: 10	Visible from: Physical Disturbance	River, Highway, Air. Dust, Waste, Stockpiles. Noises.
15	RESOURCE UTILIZATION 1 (2) 3 4 5 Rating: 30	Fort Good Hope Arctic Red R. Inuvik	Improved Access. Traplines. Hunting. Fishing. Domestic. Commercial.
15	ASSOCIATED DISTURBANCES 1 2 3 4 (5) Rating: 75	Access Roads Miles From Highway Miles From Pipeline Hydrologic Alterations Continued Use For Maintenance.	0-2, 2-5, 5-10, 10+ 0-2, 2-5, 5-10, 10+ Cuts and Fills. Creek Crossings. Compaction. Slumping, Erosion. Stockpiles, Waste, Dust.
10	RESTORATION (1) 2 3 4 5 Rating: 10	Soil Stabilization Visual Improvement Habitat Replacement	Natural Regeneration. Grass-Legume Seeding. Transplants. Sustained Maintenance. Erosion Control Systems.

NOTE: SENSITIVITY INDEX RANGE

MINIMAL SENSITIVITY		MAXIMUM SENSITIVITY
100	TO	500

TOTAL INDEX: 205

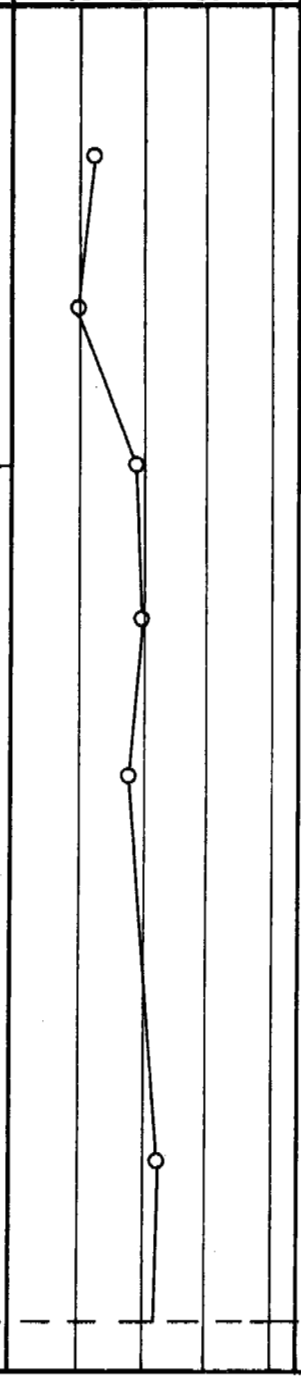
SPECIAL CONCERNS: Within winter range of Barren-Ground Caribou.
Maintain siltation controls.

F.F. SLANEY & COMPANY LIMITED
VANCOUVER, B. C.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1150 HOLE NO. 1 PAGE 1 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION
1	SM	SAND -silty, organic content, orange-brown, fine to medium fine grained, dry.	NOT FROZEN
2			
3	SP	SAND -trace of silt, medium-fine, dry, light grey-brown	
4		5.9% O.C.	
5		(4'+6') 99% SAND 1% SILT & CLAY	
6		-silt content increase to some silt.	FROZEN
7	SM		
8		(8'+10') 1% GRAVEL 76% SAND 23% SILT & CLAY	
9			
10		-fine to medium-fine grained, silty	
11			
12			
13			
14		-fine sand, silty	
15			
16			
17			



DATE DRILLED: Sep. 13/73 LOGGED BY: EBA 113-1 COMPLETION DEPTH: 27.5'

DRILLING METHOD: AUGER THAW DEPTH: 6.0'

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY - STAGE III

SITE NO. 1150 HOLE NO. 1 PAGE 2 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
		SAND	FROZEN		
18		-fine, silty, light brown			18
19	SM				19
20					20
21					21
22					22
23					23
24					24
25					25
26					26
27					27
28					28
+		END OF HOLE			
29					29
30					30
31					31
32					32
33					33
34					34

DATE DRILLED: Sep. 13/73 | LOGGED BY: EBA 113-1 | COMPLETION DEPTH: 27.5'

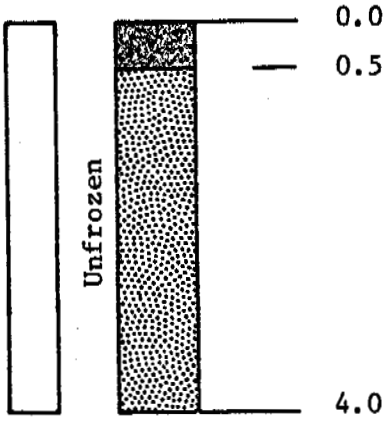
DRILLING METHOD: AUGER | THAW DEPTH: 6.0'

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

TEST PIT LOG

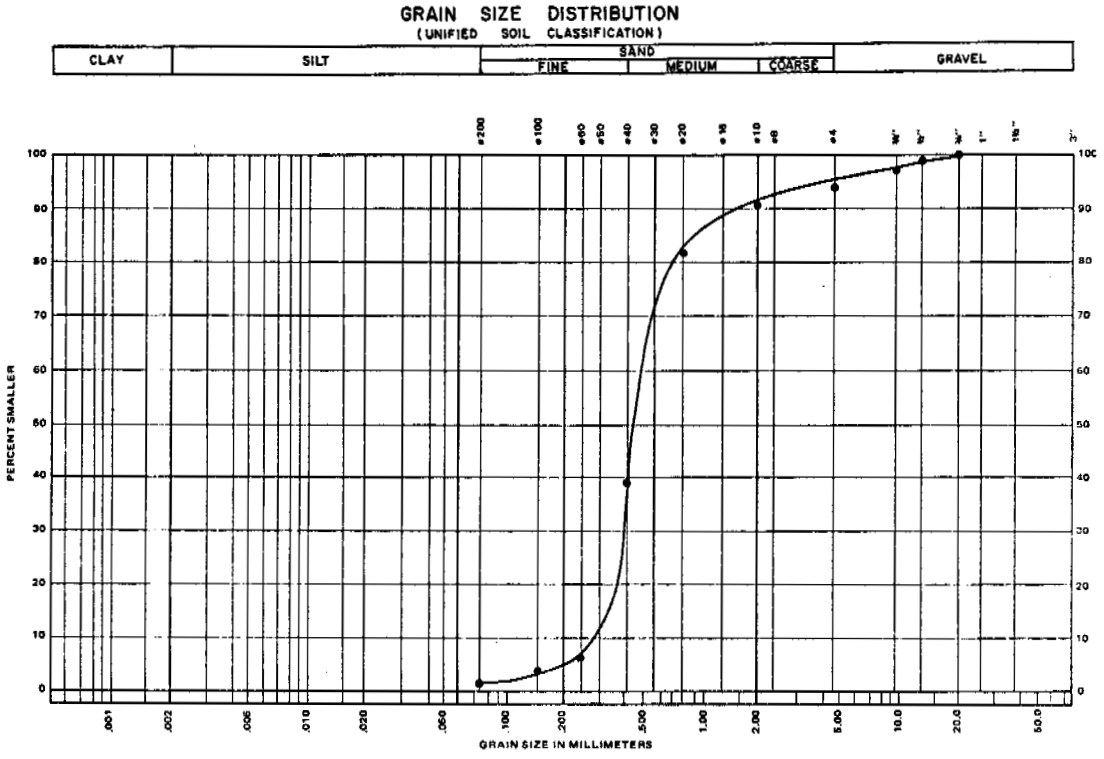
TP 1150-1



Moss

Sand, dry
some pebbles
clean

7% GRAVEL
91% SAND
2% SILT & CLAY

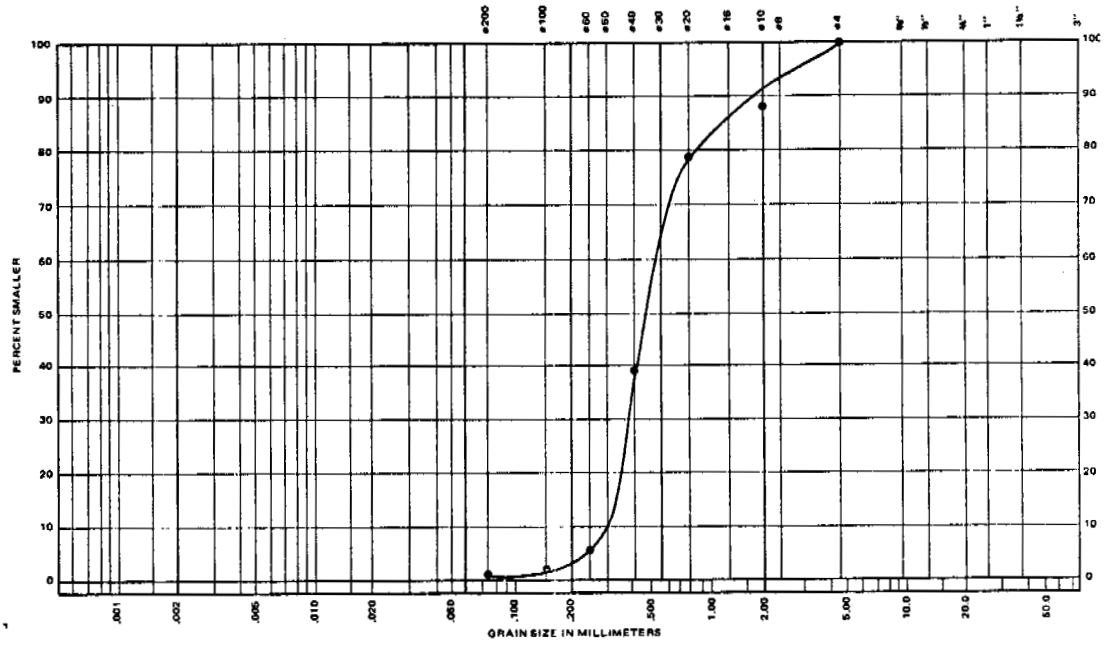


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Sand With a Trace of Gravel and Silt (SP) M/C = 2.1%

PROJECT Granular Resources
JOB No. E-666 DATE Dec. 5/73
SAMPLE No. TP 1150-1
DEPTH 4'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

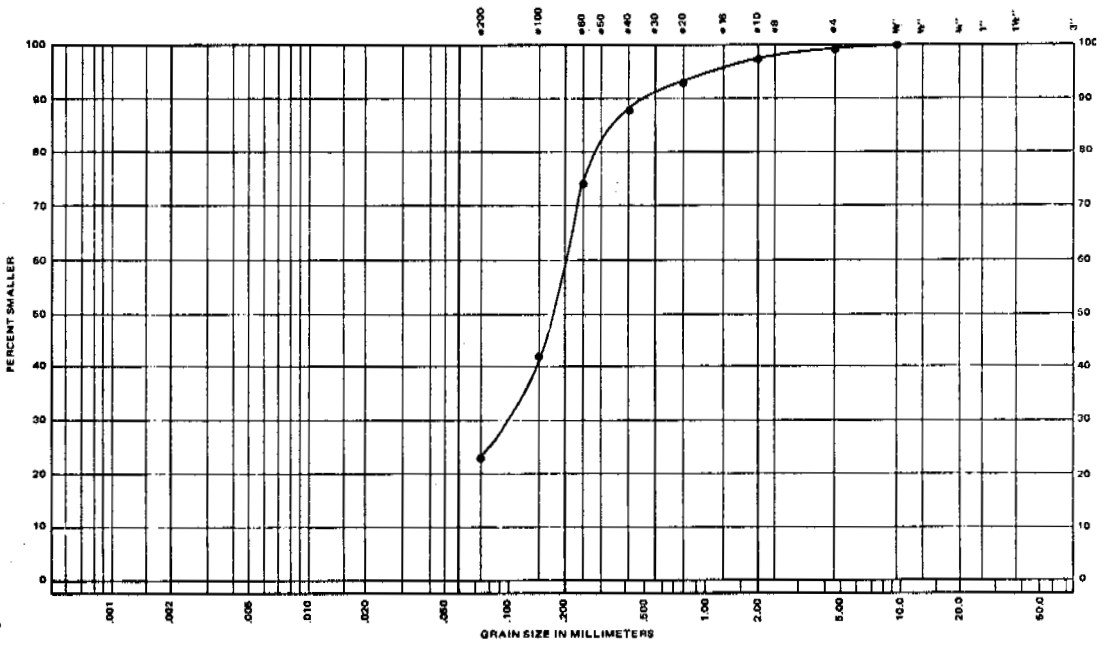


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Sand With a Trace Of Silt (SP)

PROJECT Granular Resources
JOB No. E-666 DATE Jan. 28/73
SAMPLE No. BH 1150-1
DEPTH 4'+6'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Silty Sand with a Trace of Gravel (SM)

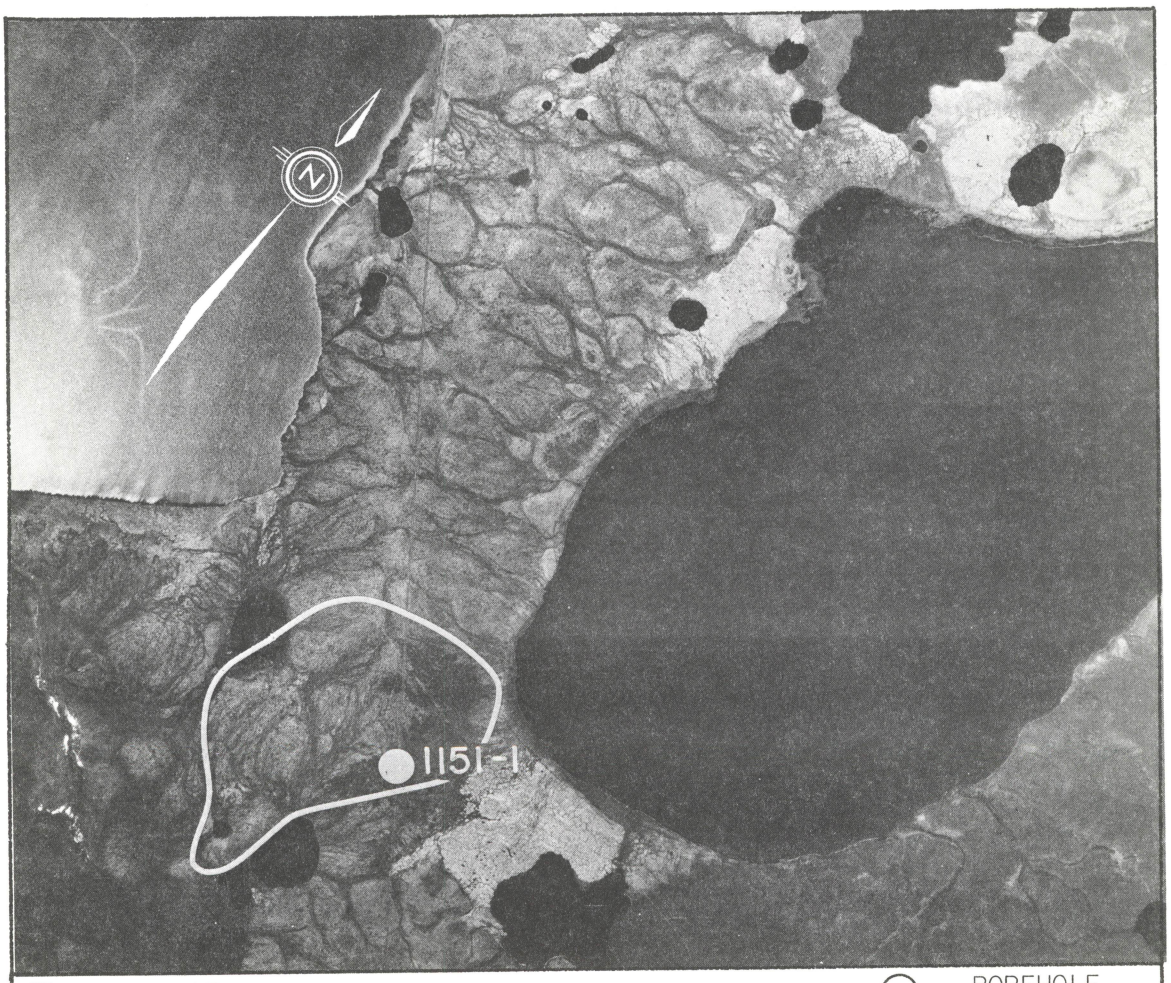
PROJECT Granular Resources
JOB No. DATE
SAMPLE No. BH 1150-1
DEPTH 8' + 10'

SITE 1151a

Location: Site 1151 is situated between the Lost Reindeer Lakes. Proposed pipeline and highway routes are 22 and 28 miles west of the site respectively.

Material: Shale.

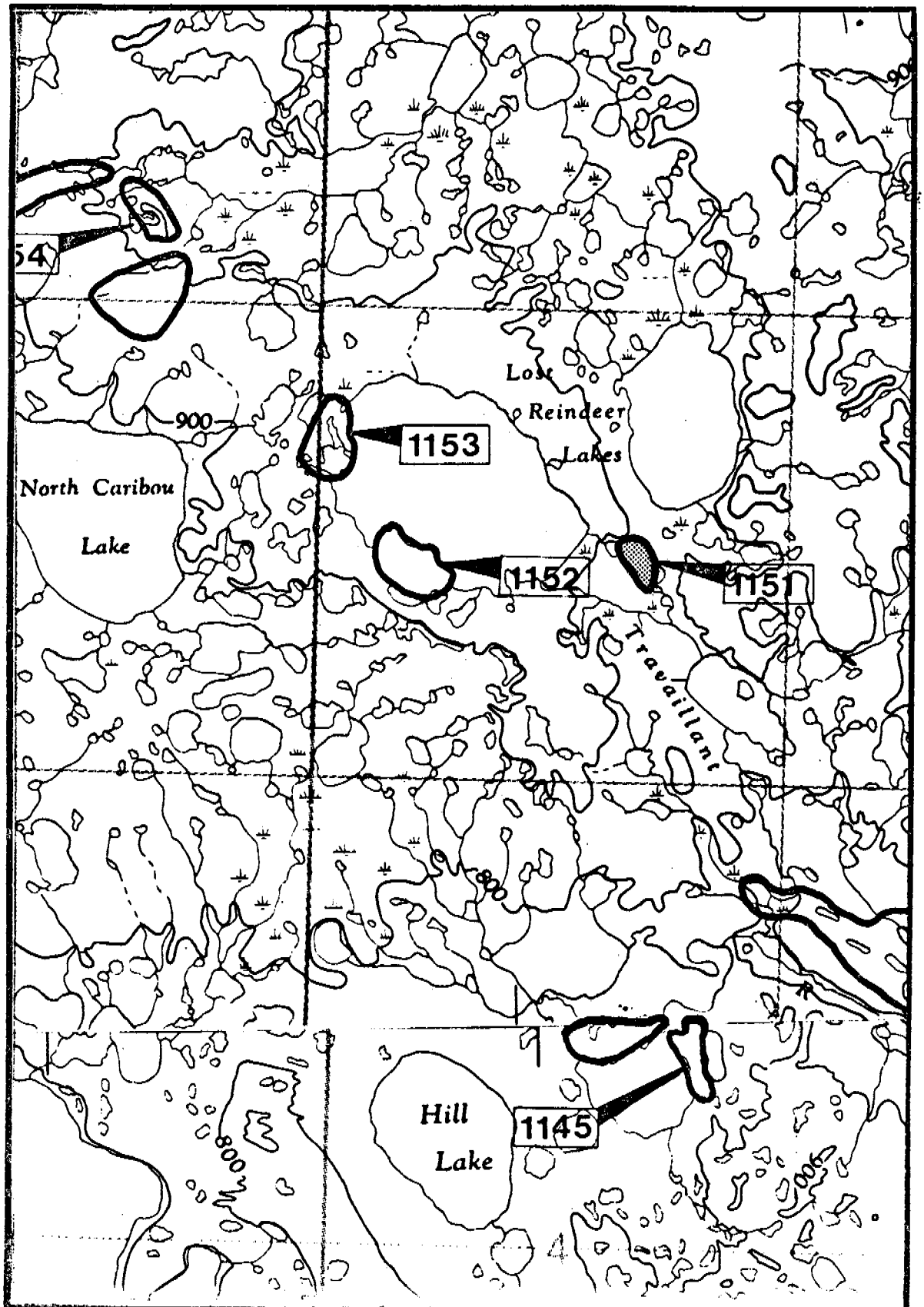
Assessment: Overburden thickness of 19 feet of thermally sensitive silt and till overlies the firm, dry shale at site 1151. Permafrost was encountered just below the surface. The site has a high



□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A22935-110 SCALE: 1" = 3000' (approx.)

environmental sensitivity rating. Access to the site is difficult because of hilly, thermally sensitive terrain and numerous lakes. Haulage distance to proposed construction sites is excessively long. The thick overburden and long haulage distance probably preclude the site from development.



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: ARTIC RED RIVER 106-N
AKLAVIK 107-B

SCALE: 1:125,000

SITE 1151

ENVIRONMENTAL SENSITIVITY INDEX

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	TERRAIN 1 (2) 3 4 5 Rating: 10	Formation Stability Ice Content	Flat Land, Terrace, Knoll, Rolling, Outcrop, Ridge, Scarp, Overburden Type & Depth, Wet Site, Dry Site.
5	VEGETATION 1 2 (3) 4 5 Rating: 15	Aesthetic Value Habitat Value	Marsh Black Spruce Muskeg White Spruce Mixed Conifer Conifer - Deciduous Deciduous Dry Slopes Riparian
15	MAMMALS 1 2 (3) 4 5 Rating: 45	Ungulates Furbearers Carnivores Small Mammals	Winter Range, Summer Range, Migration Route, Denning Area, Dams and Lodges, Special Habitat Use.
10	BIRDS 1 2 (3) 4 5 Rating: 30	Waterfowl-Swans, Geese, Ducks Game Birds Raptors Shorebirds Passerine	Migration Pathway, Moulting, Spring Staging, Fall Staging, Nesting-Brooding, Perching, Winter Habitat.
10	FISHERY 1 2 (3) 4 5 Rating: 30	Lakes, Tributaries Mackenzie River: Whitefish Grayling Pike Trout-Perch Lake Trout Burbot Suckers Stickleback Smelt Sculpin Goldeye Chub Dace Walleye Char Cisco	Spawning, Nursery, Feeding, Overwintering. Major Migration Route. Siltation of Spawning Areas, Benthic Communities. Toxic Material Spill. Slumps, Velocity Increments, Migration Barriers. Eutrophication. Blasting.
5	ARCHAEOLOGY 1 2 (3) 4 5 Rating: 15	Paleontology Pre-Historic Historic	Probability of Discovery. Low, Medium, High. Known Sites.
10	AESTHETICS (1) 2 3 4 5 Rating: 10	Visible from: Physical Disturbance	River, Highway, Air. Dust, Waste, Stockpiles. Noises.
15	RESOURCE UTILIZATION 1 (2) 3 4 5 Rating: 30	Fort Good Hope Arctic Red R. Inuvik	Improved Access. Traplines. Hunting. Fishing. Domestic. Commercial.
15	ASSOCIATED DISTURBANCES 1 2 3 4 (5) Rating: 75	Access Roads Miles From Highway Miles From Pipeline Hydrologic Alterations Continued Use For Maintenance.	0-2, 2-5, 5-10, 10+ 0-2, 2-5, 5-10, 10+ Cuts and Fills. Creek Crossings. Compaction, Slumping, Erosion. Stockpiles, Waste, Dust.
10	RESTORATION 1 (2) 3 4 5 Rating: 20	Soil Stabilization Visual Improvement Habitat Replacement	Natural Regeneration. Grass-Legume Seeding. Transplants. Sustained Maintenance. Erosion Control Systems.

R.I.R. - Relative Importance Units - Base of 100 units.

NOTE: SENSITIVITY INDEX RANGE

MINIMAL SENSITIVITY		MAXIMUM SENSITIVITY
100	TO	500

TOTAL INDEX: 280

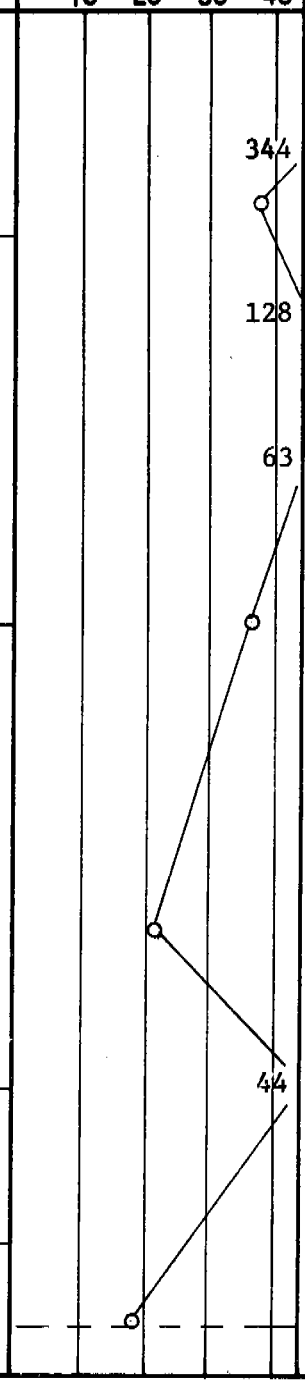
SPECIAL CONCERNS: In lake complex south-east of Lost Reindeer Lake. Within Barren-Ground Caribou winter range. Buffer zones and seasonal operations may be required.

F.F. SLANEY & COMPANY LIMITED
VANCOUVER, B. C.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1151 HOLE NO. 1 PAGE 1 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION
1	PT	PEAT brown fibrous silty	Nbn
2			
3	ML	SILT brown clayey	
4			V_r
5			
6			
7			
8			
9	GM	GRAVEL (till) grey clayey sandy	Nbn
10			
11			
12			
13			
14			V_r
15	CH	CLAY grey silty (weathered shales)	
16			Nbn
17			



DATE DRILLED: Mar. 24/72 | LOGGED BY: MVPL 72C-129 | COMPLETION DEPTH: 40'

DRILLING METHOD: Failing 1000 Air | THAW DEPTH: N/A

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY - STAGE III

SITE NO. 1151 HOLE NO. 1 PAGE 2 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
18	CH	CLAY grey silty (weathered shales)	Nbn		18
19					19
20					20
21					21
22					22
23					23
24	br	SHALE grey silty, firm			24
25					25
26					26
27					27
28					28
29					29
30					30
31					31
32					32
33					33
34					34

DATE DRILLED: Mar 24/72 LOGGED BY: MVPL 72C-129 COMPLETION DEPTH: 40'

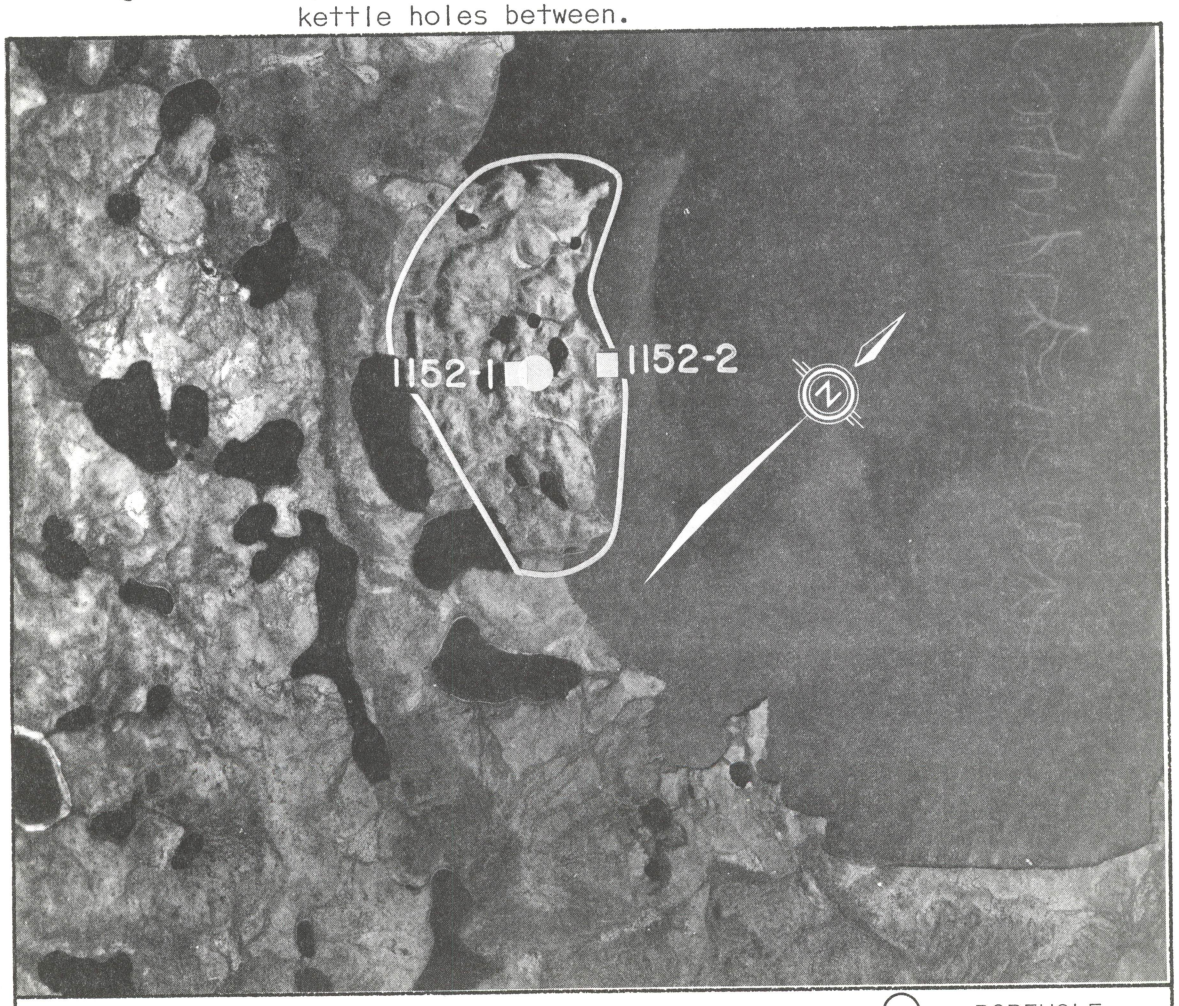
DRILLING METHOD: Failing 1000 Air THAW DEPTH: N/A

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

SITE 1152a

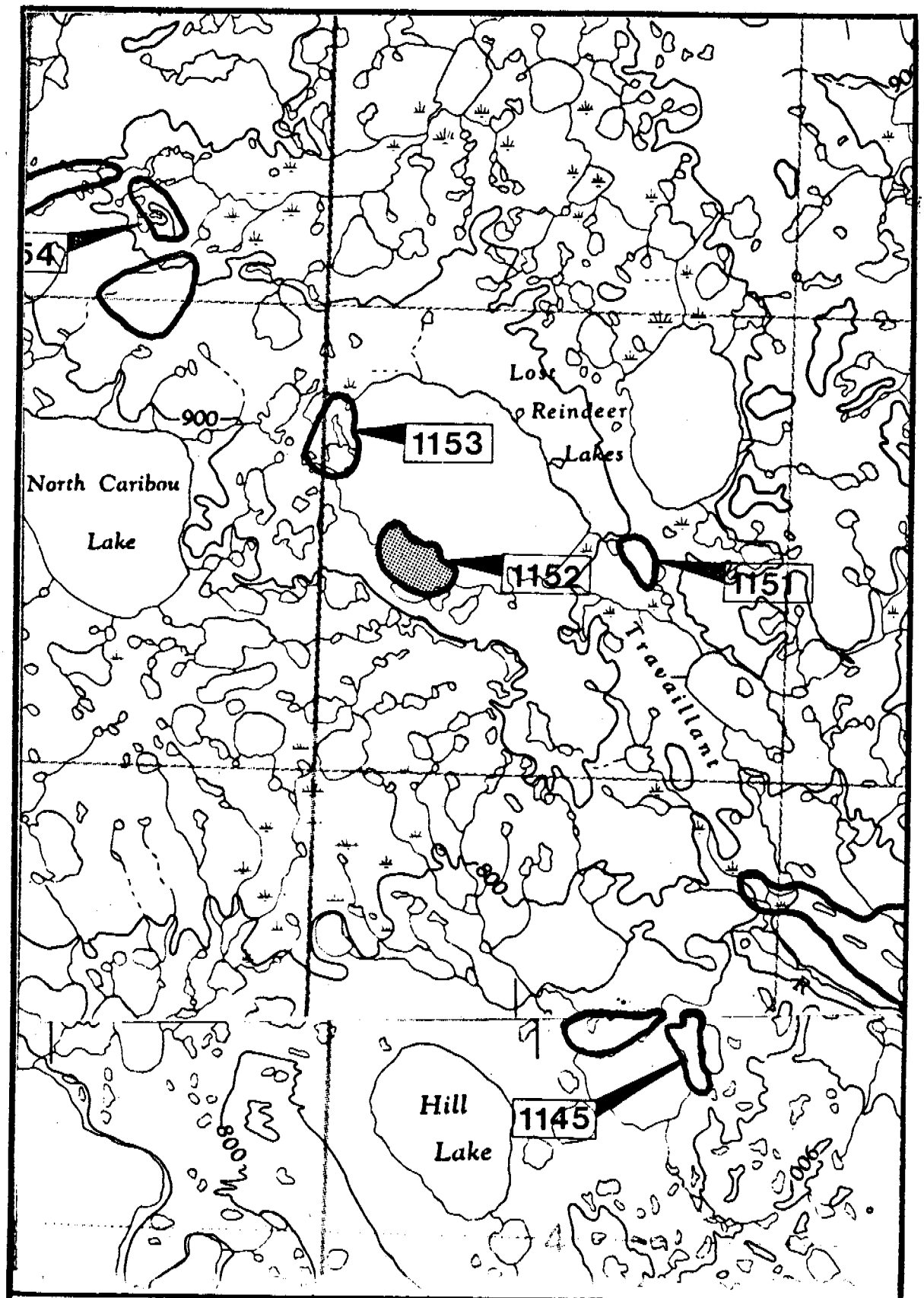
Location:	Site 1152 is located along the shore of one of the Lost Reindeer Lakes, 8 miles north-east of Caribou Lake. Proposed pipeline and highway routes are 18 and 24 miles west of the site respectively.
Geology:	Site 1152 is a complex of relatively large kames.
Material:	Sand and gravel, trace to some silt, well graded.
Volume:	4,200,000 cu. yd., estimate is conservative.
Area:	175 acres.
Drainage:	Upland areas are well drained with poorly drained kettle holes between.



□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A22935-191 SCALE: 1" = 3000' (approx.)

Assessment: The borrow material samples at site 1152 was of fair quality but is expected to vary from kame to kame. Overburden, consisting of 8 1/2 feet of peat and 2 1/2 feet of silt, was found to overlie the borrow material at the borehole location. However, this should be considered a worst condition since the borehole was not located on top of a kame but on a natural sidehill bench. Vegetative cover at the site is sparse. Moisture contents of the borrow material are high which would necessitate stockpiling and draining before use. The ground was found to be frozen from approximately one foot below the surface, however, the active layer would be expected to extend to depths up to 10 feet at the other locations within the site. The site has been assessed a high environmental sensitivity rating. Access is difficult because of hilly, thermally sensitive terrain and numerous lakes. Winter operations would be necessary. Haulage distance to proposed construction sites is very long. The site is <u>not</u> recommended for development unless material shortages in the immediate area are critical at which time it should be reassessed by further field drilling.



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: ARTIC RED RIVER 106-N
AKLAVIK 107-B

SCALE: 1:125,000

SITE 1152

ENVIRONMENTAL SENSITIVITY INDEX

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	TERRAIN 1 2 3 4 5 Rating: 5	Formation Stability Ice Content	Flat Land, Terrace, Knoll, Rolling, Outcrop, Ridge, Scarp, Overburden Type & Depth, Wet Site, Dry Site.
5	VEGETATION 1 2 3 4 5 Rating: 15	Aesthetic Value Habitat Value	Marsh Black Spruce Muskeg White Spruce Mixed Conifer Conifer - Deciduous Deciduous Dry Slopes Riparian
15	MAMMALS 1 2 3 4 5 Rating: 60	Ungulates Furbearers Carnivores Small Mammals	Winter Range, Summer Range, Migration Route, Denning Area, Dams and Lodges, Special Habitat Use.
10	BIRDS 1 2 3 4 5 Rating: 30	Waterfowl-Swans, Geese, Ducks Game Birds Raptors Shorebirds Passerine	Migration Pathway, Moulting, Spring Staging, Fall Staging, Nesting-Brooding, Perching, Winter Habitat.
10	FISHERY 1 2 3 4 5 Rating: 40	Lakes, Tributaries Mackenzie River: Whitefish, Smelt Grayling, Sculpin Pike, Goldeye Trout-Perch, Chub Lake Trout, Dace Burbot, Walleye Suckers, Char Stickleback, Cisco	Spawning, Nursery, Feeding, Overwintering. Major Migration Route. Siltation of Spawning Areas, Benthic Communities. Toxic Material Spill. Slumps, Velocity Increments, Migration Barriers. Eutrophication. Blasting.

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	ARCHAEOLOGY 1 2 3 4 5 Rating: 10	Paleontology Pre-Historic Historic	Probability of Discovery. Low, Medium, High. Known Sites.
10	AESTHETICS 1 2 3 4 5 Rating: 10	Visible from: Physical Disturbance	River, Highway, Air. Dust, Waste, Stockpiles. Noises.
15	RESOURCE UTILIZATION 1 2 3 4 5 Rating: 60	Fort Good Hope Arctic Red R. Inuvik	Improved Access. Traplines. Hunting. Fishing. Domestic. Commercial.
15	ASSOCIATED DISTURBANCES 1 2 3 4 5 Rating: 75	Access Roads Miles From Highway Miles From Pipeline Hydrologic Alterations Continued Use For Maintenance.	0-2, 2-5, 5-10, 10+ 0-2, 2-5, 5-10, 10+ Cuts and Fills. Creek Crossings. Compaction. Slumping, Erosion. Stockpiles, Waste, Dust.
10	RESTORATION 1 2 3 4 5 Rating: 20	Soil Stabilization Visual Improvement Habitat Replacement	Natural Regeneration. Grass-Legume Seeding. Transplants. Sustained Maintenance. Erosion Control Systems.

R.I.R. - Relative Importance Units - Base of 100 units.

NOTE: SENSITIVITY INDEX RANGE

MINIMAL SENSITIVITY		MAXIMUM SENSITIVITY
100	TO	500

TOTAL INDEX: 325

SPECIAL CONCERNS: On west shore of Lost Reindeer Lake. Within Reindeer Grazing Reserve and winter range for Barren-ground Caribou. Buffer zone recommended to protect shoreline values.

F.F. SLANEY & COMPANY LIMITED
VANCOUVER, B. C.

GRANULAR MATERIALS INVENTORY - STAGE III

SITE NO. 1152 HOLE NO. 2 PAGE 1 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
1	Pt	PEAT: -very fibrous, somewhat woody, spongy, medium to dark brown -compressed -trace of organic silt, dark brown. -woody, medium brown	NOT FROZEN FROZEN	346 611 477	1
2					2
3					3
4					4
5					5
6					6
7					7
8					8
9	SM	SILT, sandy: -well graded, grey		52	9
10					10
11	GP-GM	GRAVEL, silty -angular, maximum 1", average ½", grey-brown. 55% GRAVEL 36% SAND 9% SILT & CLAY (15')			11
12					12
13					13
14					14
15					15
16					16
17					17

DATE DRILLED: Sep. 11/73 LOGGED BY: EBA 103-1 COMPLETION DEPTH: 27.0'

DRILLING METHOD: HELI-DRILL THAW DEPTH: 1.2'

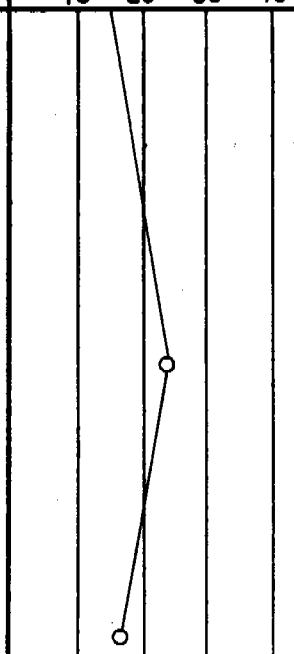
GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1152 HOLE NO. 2 PAGE 2 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
18	GP-GM	GRAVEL, silty	FROZEN		18
19					19
20	SM	SAND, silty, some gravel: -sand is med. to coarse trained, gravel is fine, angular and subangular, medium grey-brown			20
21					21
22					22
23					23
24	GM	GRAVEL, sandy, some silt: well graded, angular and subangular, average ½", grey-brown.			24
25					25
26					26
27					27
28		END OF HOLE			28
29					29
30					30
31					31
32					32
33					33
34					34



DATE DRILLED Sept.11/74 | LOGGED BY: EBA 103-1 | COMPLETION DEPTH: 27.0'

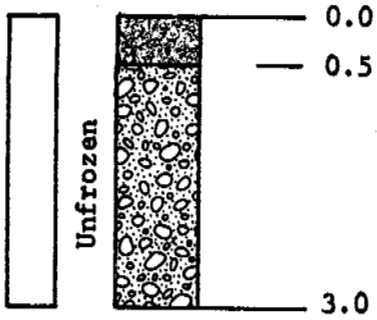
DRILLING METHOD: HELI-DRILL | THAW DEPTH: 1.2'

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

TEST PIT LOG

TP 1152-1

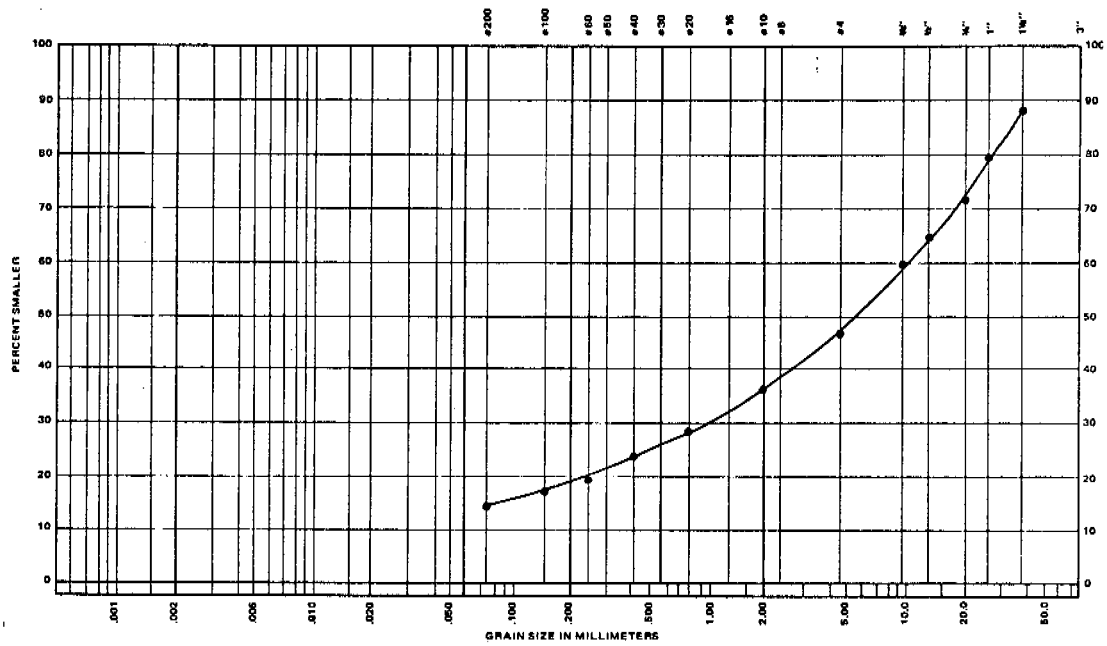


Peat

Silty Gravel, light brown angular particles

54% GRAVEL
31% SAND
15% SILT & CLAY

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

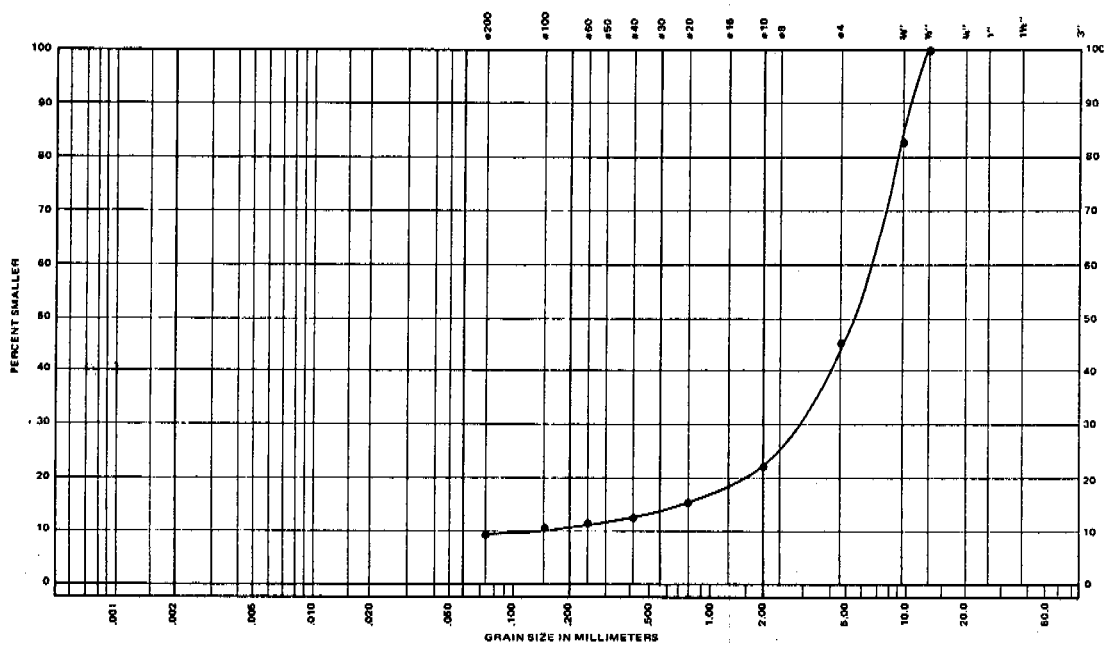


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Gravel and Sand with Some Silt(GM) M/C = 8.6%

PROJECT Granular Resources
JOB No. E-666 DATE November 23/74
SAMPLE No. TP 1152-1
DEPTH 3'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Sand and Gravel with a Trace of Silt (GP-GM)

PROJECT Granular Resources
JOB No. E-666 DATE Jan. 28/74
SAMPLE No. BH 1152-2
DEPTH 15'

SITE 1153a

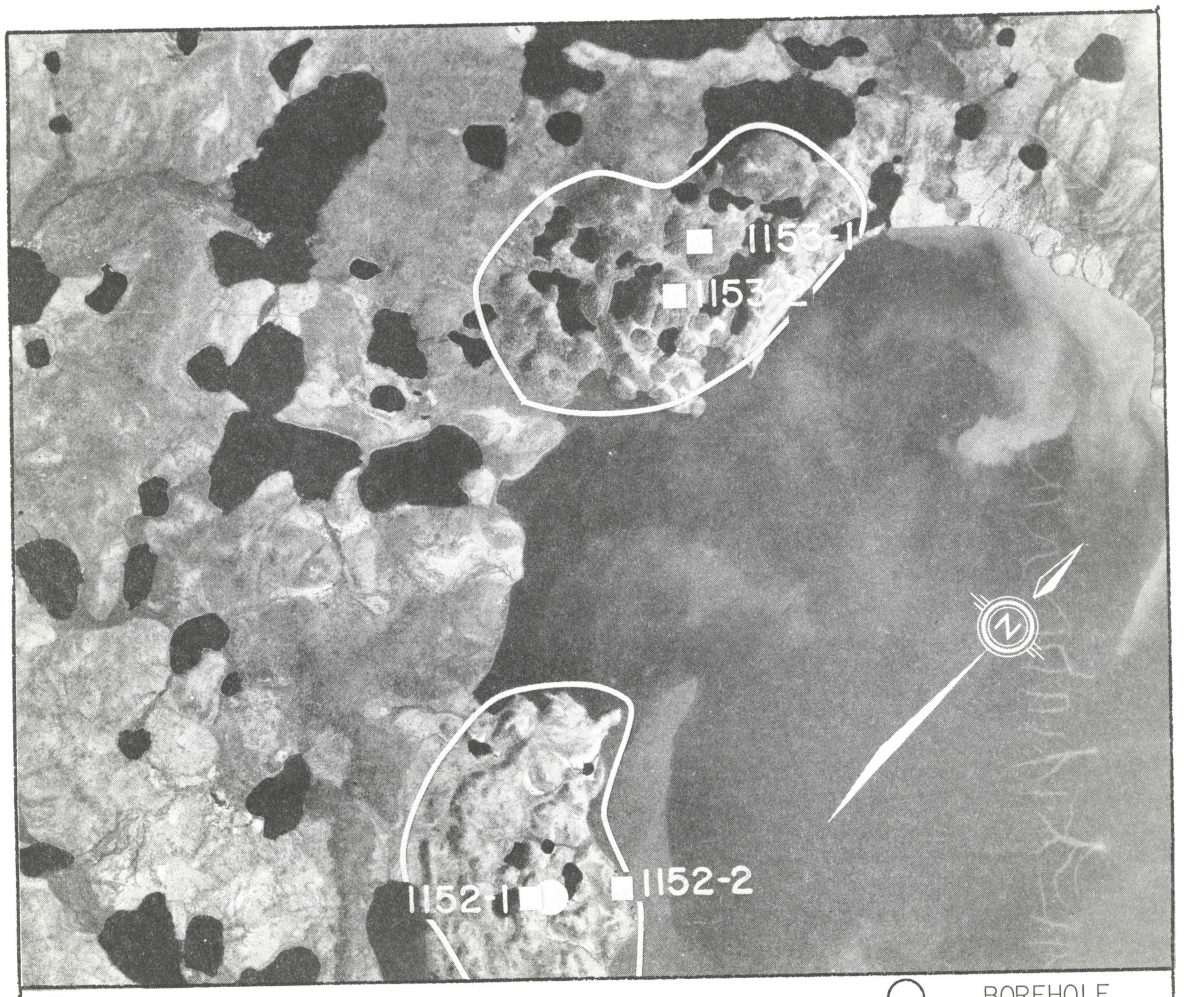
Location: Site 1153 is located along the shore of the Lost Reindeer Lakes, 2 miles east of North Caribou Lake. Proposed pipeline and highway routes are 18 and 24 miles west of the site, respectively.

Geology: Site 1153 is a kame complex with numerous small lakes between the kames.

Material: Silty sand, some gravel, well graded.

Area: 200 acres.

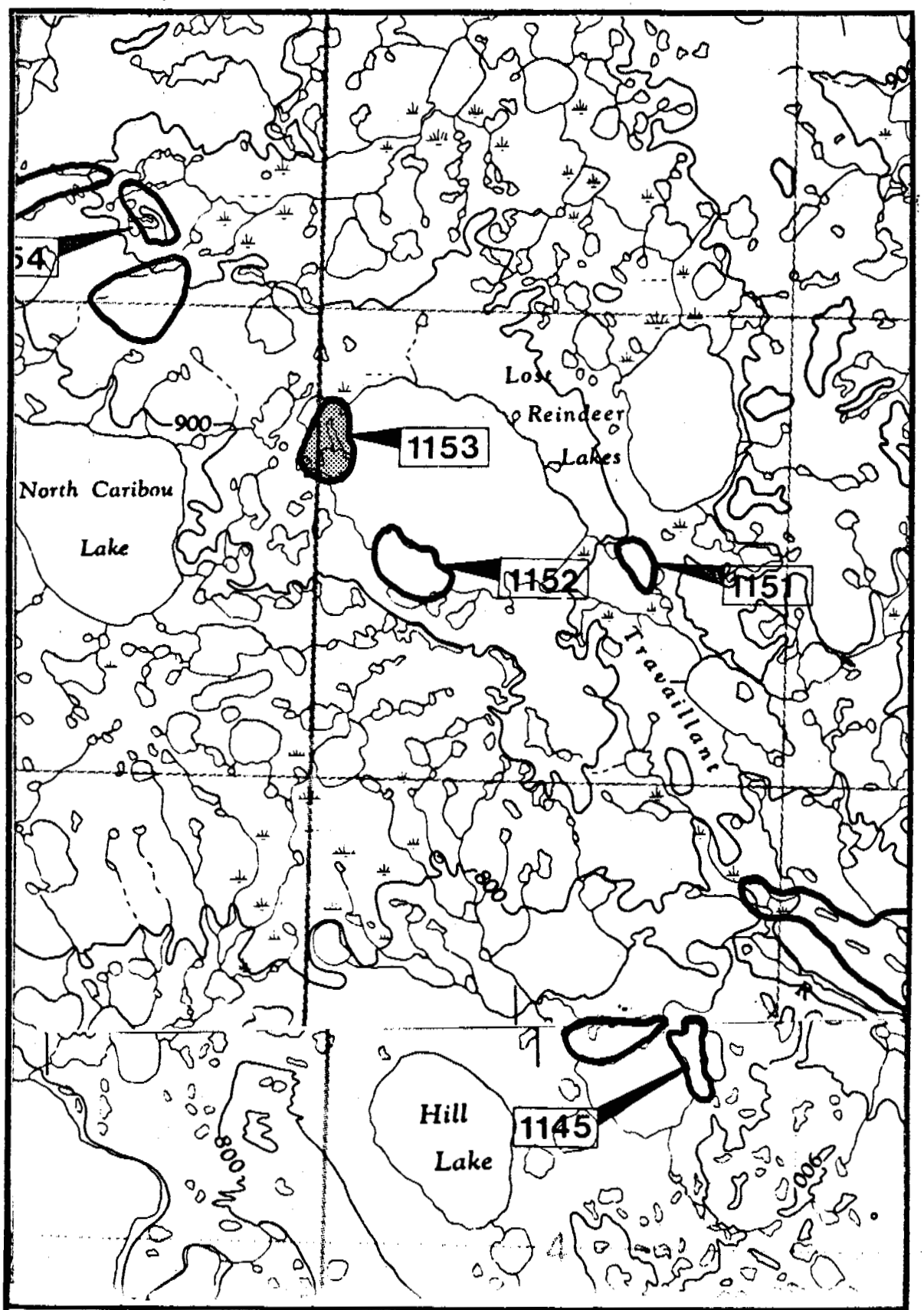
Drainage: The site is poorly drained and marshy.



□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A22935-191 SCALE: 1" = 3000' (approx.)

Assessment: The test pitting program at site 1153 revealed material which is variable from poor quality to good quality. Drilling will be necessary to determine areas of good quality borrow material and assess overburden cover. Tree cover at the site is sparse but brush cover is dense. Access to the site is difficult because of hilly, thermally sensitive terrain and numerous lakes. Winter operations would be necessary. Haulage distance to proposed construction sites is very long. Site 1153 has a promising potential as a source of borrow material; however, the long haulage distance and difficult access render the feasibility of developing the site doubtful.



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: ARTIC RED RIVER 106-N
AKLAVIK 107-B

SCALE: 1:125,000

SITE **1153**

ENVIRONMENTAL SENSITIVITY INDEX

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	TERRAIN (1) 2 3 4 5 Rating: 5	Formation Stability Ice Content	Flat Land, Terrace, Knoll, Rolling, Outcrop, Ridge, Scarp, Overburden Type & Depth, Wet Site, Dry Site.
5	VEGETATION 1 2 (3) 4 5 Rating: 15	Aesthetic Value Habitat Value	Marsh Black Spruce Muskeg White Spruce Mixed Conifer Conifer - Deciduous Deciduous Dry Slopes Riparian
15	MAMMALS 1 2 3 (4) 5 Rating: 60	Ungulates Furbearers Carnivores Small Mammals	Winter Range, Summer Range, Migration Route, Denning Area, Dams and Lodges, Special Habitat Use.
10	BIRDS 1 (2) 3 4 5 Rating: 20	Waterfowl-Swans, Geese, Ducks Game Birds Raptors Shorebirds Passerine	Migration Pathway, Moulting, Spring Staging, Fall Staging, Nesting-Brooding, Perching, Winter Habitat.
10	FISHERY 1 2 3 (4) 5 Rating: 40	Lakes, Tributaries Mackenzie River: Whitefish, Smelt Grayling, Sculpin Pike, Goldeye Trout-Perch, Chub Lake Trout, Dace Burbot, Walleye Suckers, Char Stickleback, Cisco	Spawning, Nursery, Feeding, Overwintering, Major Migration Route, Siltation of Spawning Areas, Benthic Communities, Toxic Material Spill, Slumps, Velocity Increments, Migration Barriers, Eutrophication, Blasting.
5	ARCHAEOLOGY 1 (2) 3 4 5 Rating: 10	Paleontology Pre-Historic Historic	Probability of Discovery. Low, Medium, High. Known Sites.
10	AESTHETICS (1) 2 3 4 5 Rating: 10	Visible from: Physical Disturbance	River, Highway, Air. Dust, Waste, Stockpiles. Noises.
15	RESOURCE UTILIZATION 1 2 3 (4) 5 Rating: 60	Fort Good Hope Arctic Red R. Inuvik	Improved Access. Traplines. Hunting. Fishing. Domestic. Commercial.
15	ASSOCIATED DISTURBANCES 1 2 3 4 (5) Rating: 75	Access Roads Miles From Highway Miles From Pipeline Hydrologic Alterations Continued Use For Maintenance.	0-2, 2-5, 5-10, 10+ 0-2, 2-5, 5-10, 10+ Cuts and Fills. Creek Crossings. Compaction, Slumping, Erosion. Stockpiles, Waste, Dust.
10	RESTORATION 1 (2) 3 4 5 Rating: 20	Soil Stabilization Visual Improvement Habitat Replacement	Natural Regeneration. Grass-Legume Seeding. Transplants. Sustained Maintenance. Erosion Control Systems.

R.I.R. - Relative Importance Units - Base of 100 units.

NOTE: SENSITIVITY INDEX RANGE

MINIMAL SENSITIVITY		MAXIMUM SENSITIVITY
100	TO	500

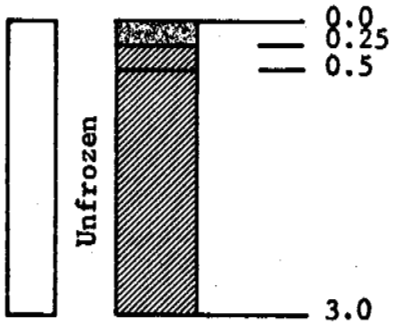
TOTAL INDEX: 315

SPECIAL CONCERNS: On west shore, Lost Reindeer Lake. Buffer zone recommended. Within Reindeer Grazing Reserve and winter range for Barren Ground Caribou.

F.F. SLANEY & COMPANY LIMITED
VANCOUVER, B. C.

TEST PIT LOG

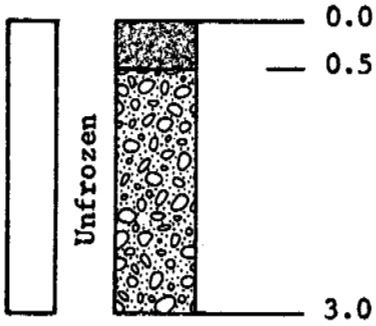
TP 1153-1



Peat
Organic Clay

Silty Clay, silty clay, with cobbles, sandy, some gravel particles

TP 1153-2

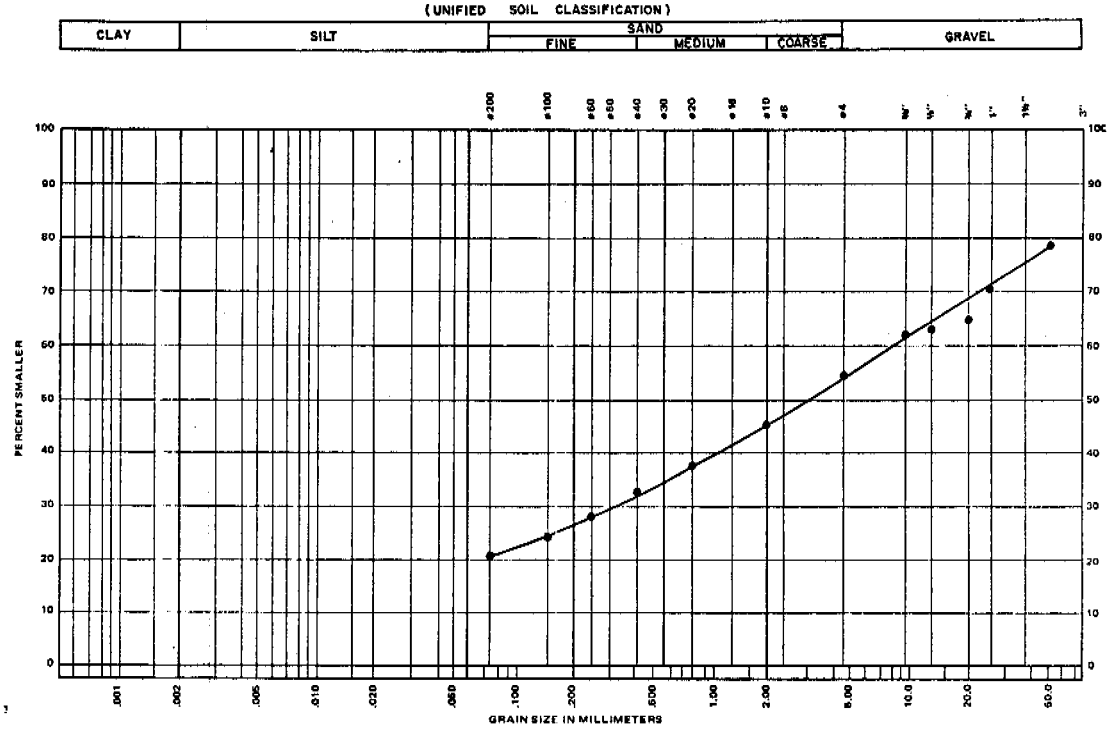


Moss

Gravel, grey
moist
clayey

40% GRAVEL
43% SAND
27% SILT & CLAY

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

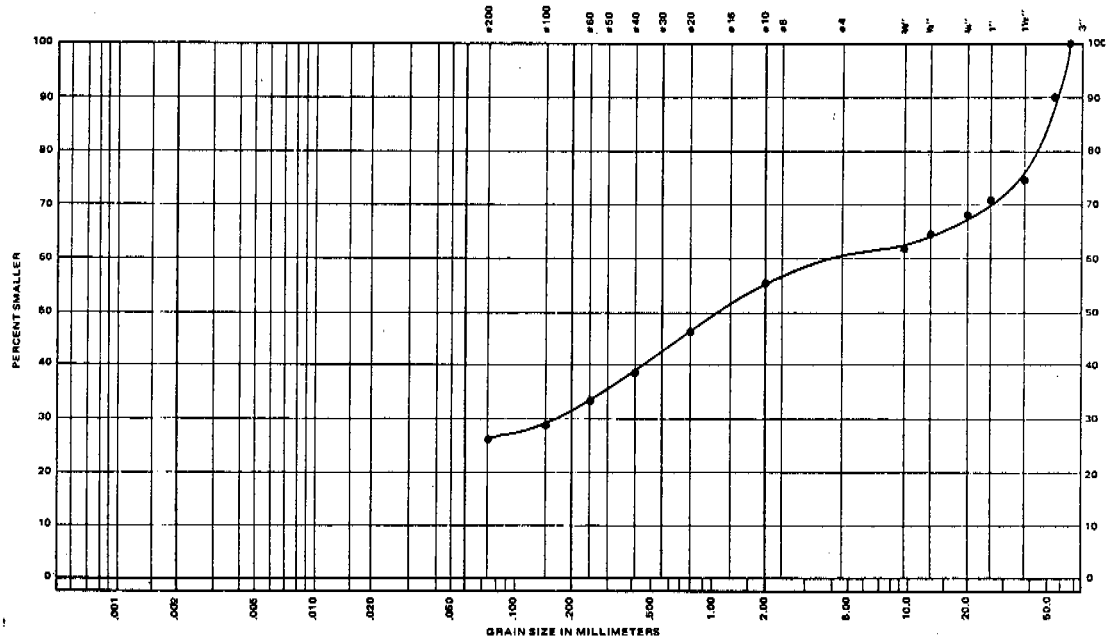


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION (GM) Gravel and Silty Sand M/C = 7.9 %

PROJECT Granular Resources
JOB No. E-666 DATE Nov. 30/73
SAMPLE No. TP 1153-2
DEPTH surface

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION (GM) Gravel and Silty Sand M/C = 6.0%

PROJECT Granular Resources
JOB No. E-666 DATE Nov. 30/73
SAMPLE No. TP 1153-2 (GM)
DEPTH 3'

SITE 1154a

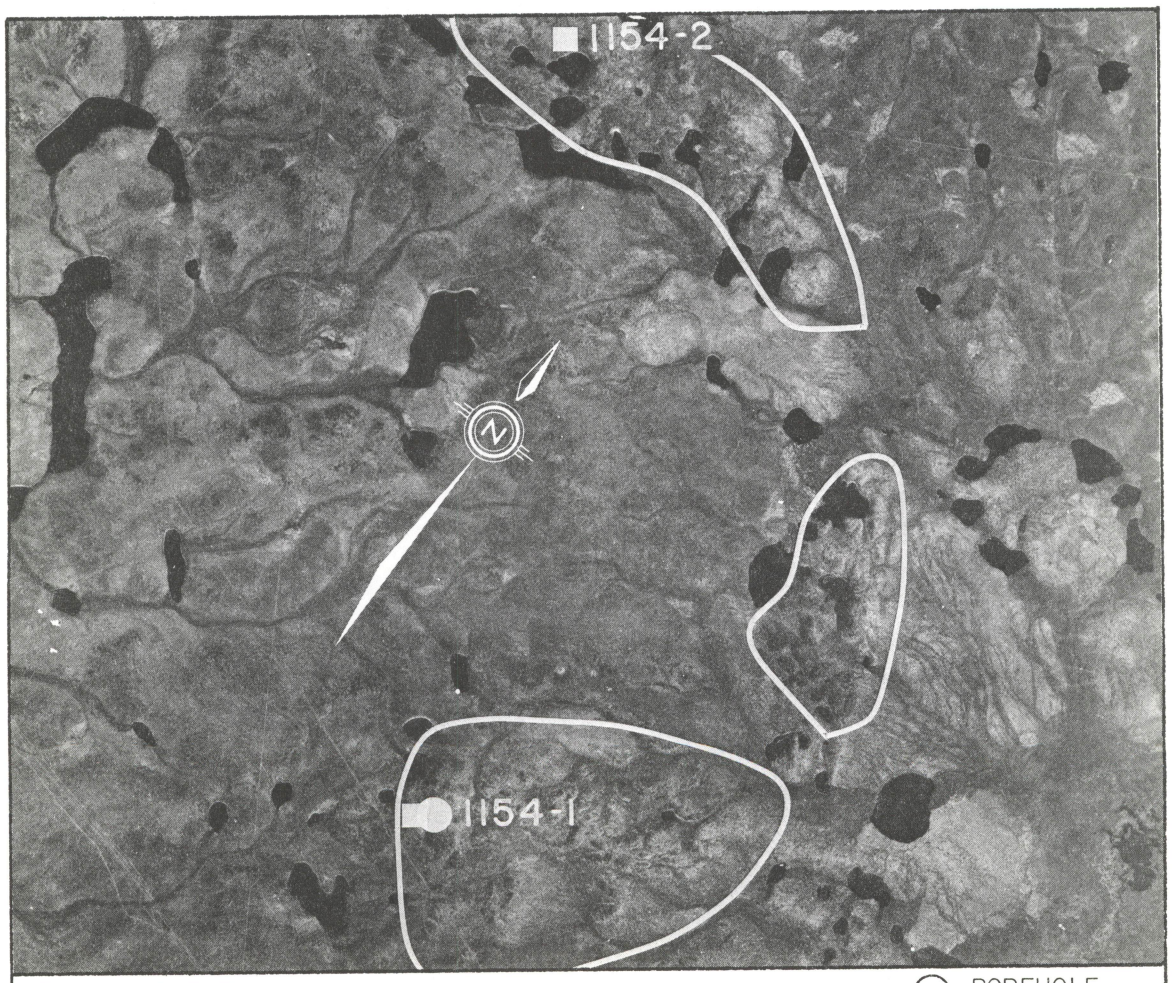
Location: Site 1154 is 2 1/2 miles north of North Caribou Lake. Proposed pipeline and highway routes are 15 and 19 miles west of the site, respectively.

Geology: Site 1154 is an extensive kame complex.

Material: Material is variable from clayey gravel to silt and sand, grading variable.

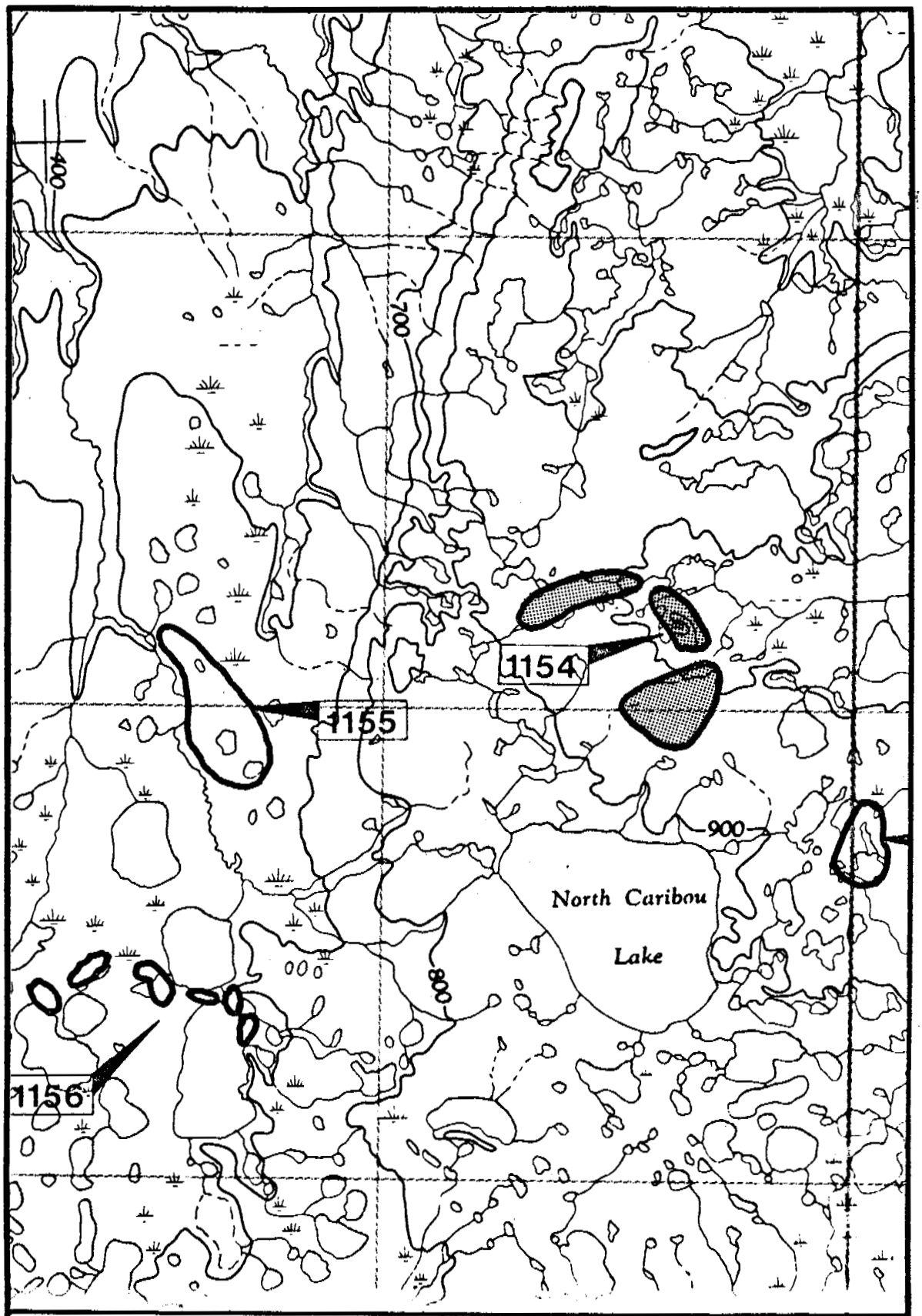
Area: 300 acres.

Assessment: The material at site 1154 is of poor quality and generally unsuitable for engineering uses. Site 1154 is not recommended for development.



□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A22935-188 SCALE: 1" = 3000' (approx.)



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: AKLAVIK 107-B

SCALE: 1:125,000

SITE 1154

ENVIRONMENTAL SENSITIVITY INDEX

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	TERRAIN 1 (2) 3 4 5 Rating: 10	Formation Stability Ice Content	Flat Land, Terrace, Knoll, Rolling, Outcrop, Ridge, Scarp, Overburden Type & Depth, Wet Site, Dry Site.
5	VEGETATION 1 2 (3) 4 5 Rating: 15	Aesthetic Value Habitat Value	Marsh Black Spruce Muskeg White Spruce Mixed Conifer Conifer - Deciduous Deciduous Dry Slopes Riparian
15	MAMMALS 1 2 3 (4) 5 Rating: 60	Ungulates Furbearers Carnivores Small Mammals	Winter Range, Summer Range, Migration Route, Denning Area, Dams and Lodges, Special Habitat Use.
10	BIRDS 1 2 (3) 4 5 Rating: 30	Waterfowl-Swans, Geese, Ducks Game Birds Raptors Shorebirds Passerine	Migration Pathway, Moulting, Spring Staging, Fall Staging, Nesting-Brooding, Perching, Winter Habitat.
10	FISHERY 1 2 (3) 4 5 Rating: 30	Lakes, Tributaries Mackenzie River: Whitefish, Smelt Grayling, Sculpin Pike, Goldeye Trout-Perch, Chub Lake Trout, Dace Burbot, Walleye Suckers, Char Stickleback, Cisco	Spawning, Nursery, Feeding, Overwintering. Major Migration Route. Siltation of Spawning Areas, Benthic Communities. Toxic Material Spill. Slumps, Velocity Increments, Migration Barriers. Eutrophication. Blasting.
5	ARCHAEOLOGY 1 (2) 3 4 5 Rating: 10	Paleontology Pre-Historic Historic	Probability of Discovery. Low, Medium, High. Known Sites.
10	AESTHETICS (1) 2 3 4 5 Rating: 10	Visible from: Physical Disturbance	River, Highway, Air. Dust, Waste, Stockpiles, Noises.
15	RESOURCE UTILIZATION 1 2 (3) 4 5 Rating: 45	Fort Good Hope Arctic Red R. Inuvik	Improved Access. Traplines. Hunting. Fishing. Domestic. Commercial.
15	ASSOCIATED DISTURBANCES 1 2 3 4 (5) Rating: 75	Access Roads Miles From Highway Miles From Pipeline Hydrologic Alterations Continued Use For Maintenance.	0-2, 2-5, 5-10, 10+ 0-2, 2-5, 5-10, 10+ Cuts and Fills. Creek Crossings. Compaction. Slumping, Erosion. Stockpiles, Waste, Dust.
10	RESTORATION 1 (2) 3 4 5 Rating: 20	Soil Stabilization Visual Improvement Habitat Replacement	Natural Regeneration. Grass-Legume Seeding. Transplants. Sustained Maintenance. Erosion Control Systems.

R.I.R. - Relative Importance Units - Base of 100 units.

NOTE: SENSITIVITY INDEX RANGE

MINIMAL SENSITIVITY		MAXIMUM SENSITIVITY
100	TO	500

TOTAL INDEX: 315

SPECIAL CONCERNS: Headwater area. Within Reindeer Grazing Reserve, and winter range for Barren Ground Caribou.

F.F. SLANEY & COMPANY LIMITED
VANCOUVER, B. C.

GRANULAR MATERIALS INVENTORY - STAGE III

SITE NO. 1154 HOLE NO. 1 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
1	Pt	PEAT -fibrous, silty with depth, brown	NOT FROZEN		1
2	ML	SILT -trace of sand, trace of clay, grey	FROZEN		2
3					3
4				117.6	4
5					5
6		-grey to grey brown.		47.4	6
7					7
8				52.2	8
9					9
10		-clayey		55.8	10
11					11
12					12
13					13
14					14
15				51.0	15
16		END OF HOLE			16
17					17

DATE DRILLED: Sep. 10/73 LOGGED BY: EBA 101-1 COMPLETION DEPTH: 15.0

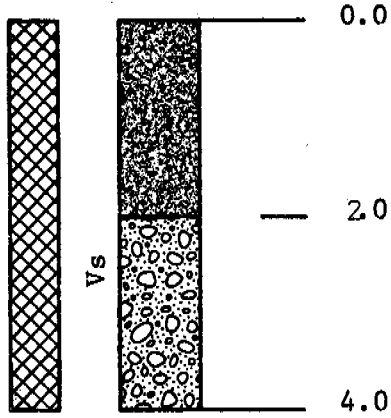
DRILLING METHOD: AUGER & CONVENTIONAL AIR THAW DEPTH: 1.5'

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

TEST PIT LOG

TP 1154-1



0.0

Peat

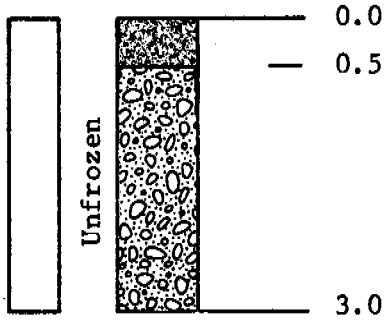
2.0

Silty sand, dark grey
20% excess ice, stones

58% SAND
42% SILT & CLAY

4.0

TP 1154-2



0.0

Moss

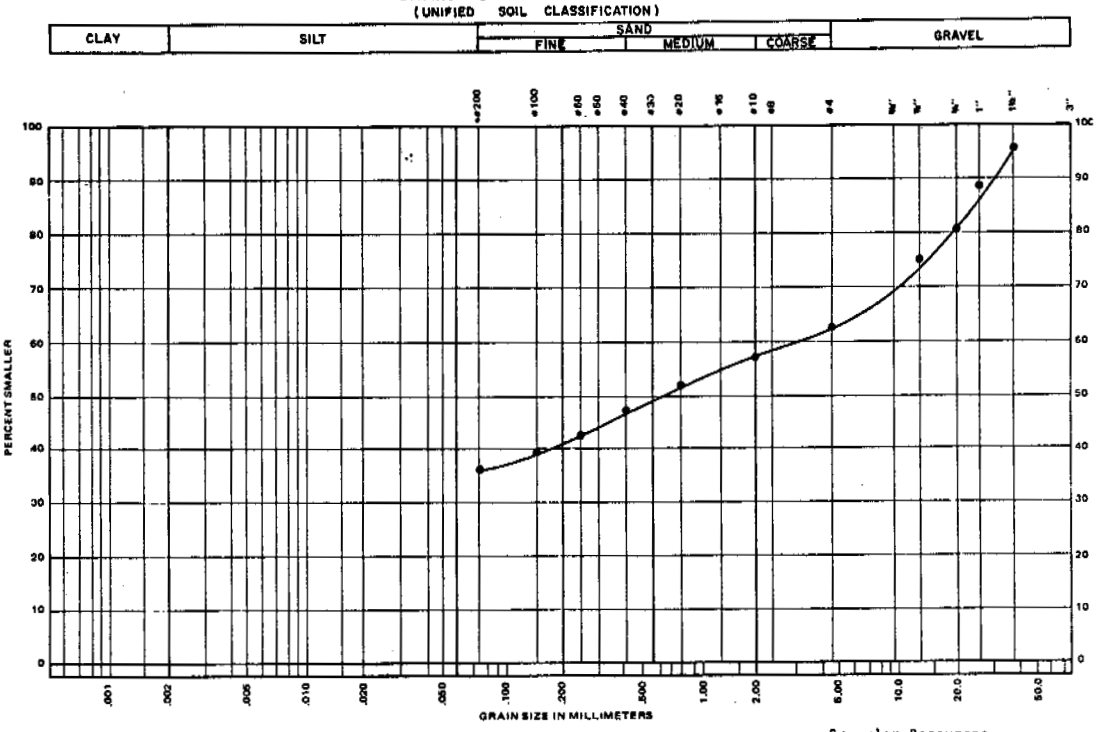
0.5

Gravel, clayey
light brown
moist

38% GRAVEL
26% SAND
36% SILT & CLAY

3.0

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

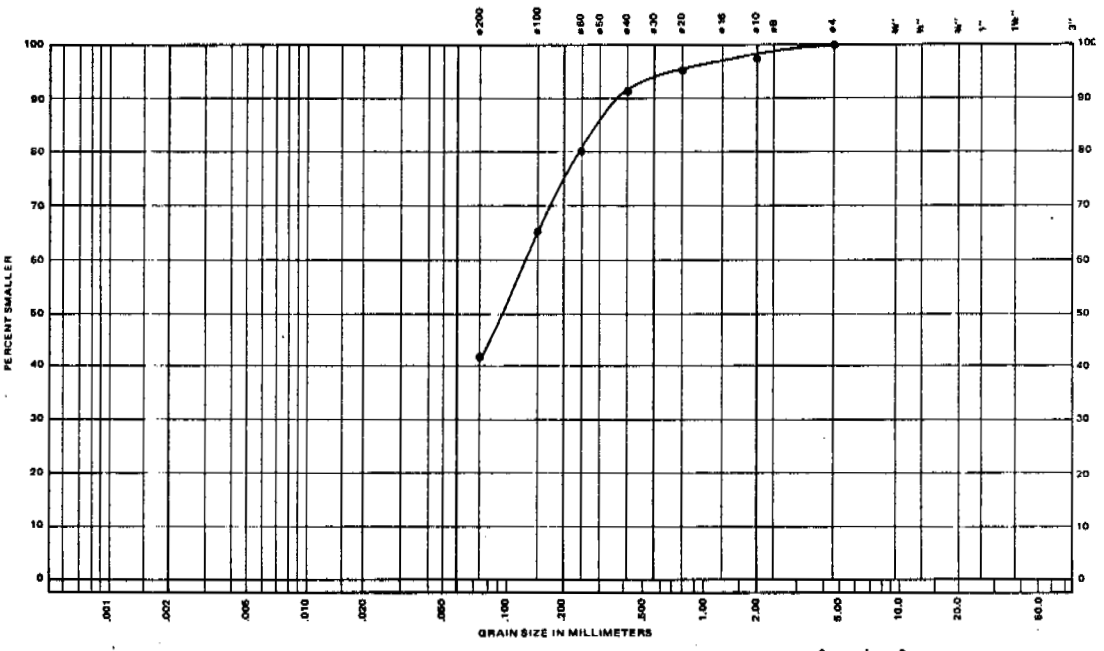


EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Gravel and Sandy Silt (GW) M/C = 13.8%

PROJECT Granular Resources
JOB No. E-666 DATE Nov. 7/73
SAMPLE No. TP 1154-2
DEPTH 3'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



EBA Engineering Consultants Ltd.

SAMPLE DESCRIPTION Silt & Sand (SM) M/C = 21.8%

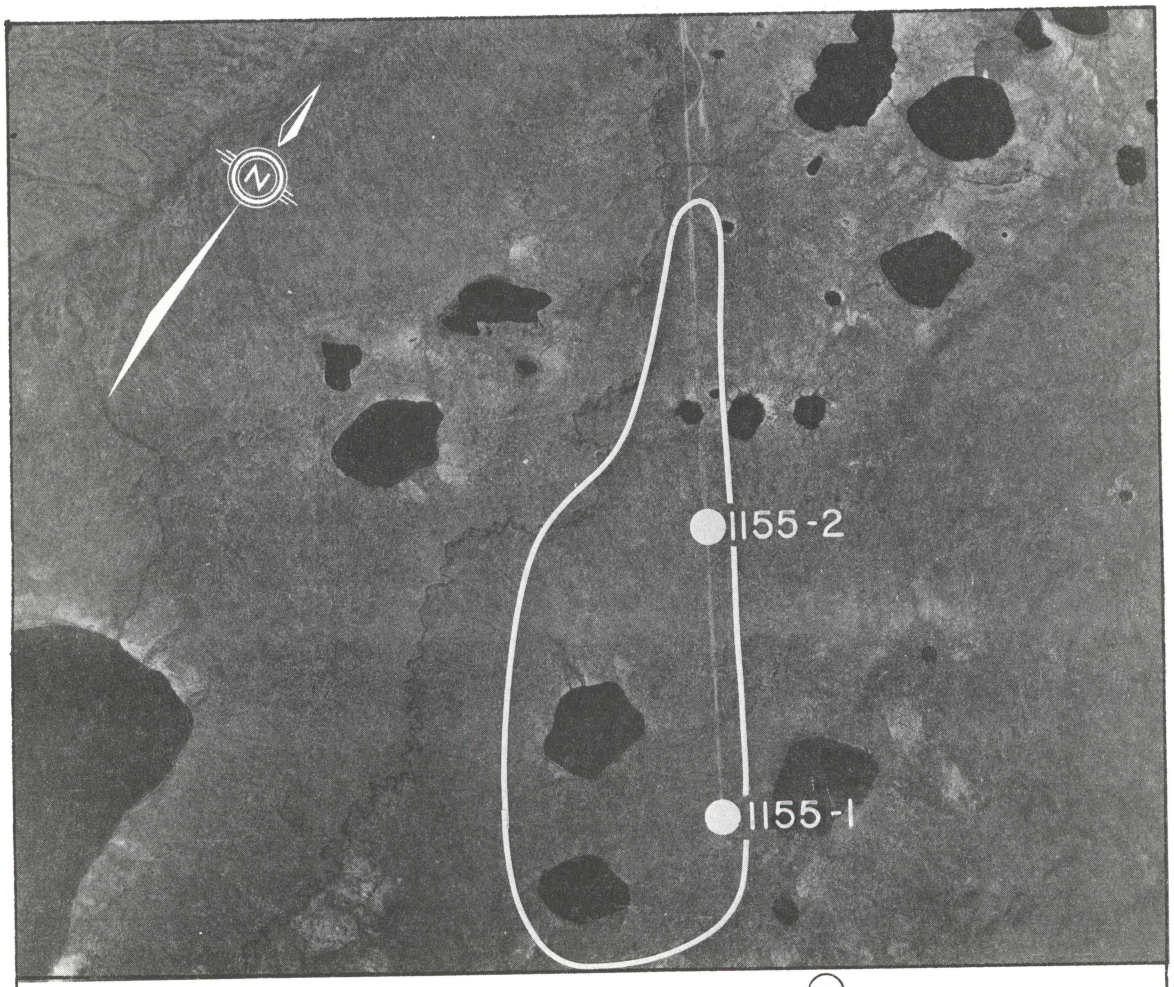
PROJECT Granular Resources
JOB No. E-666 DATE Nov. 7/73
SAMPLE No. TP 1154-1
DEPTH 4'

SITE 1155

Location: Site 1155 is a 9 situated miles north of Caribou Lake. Proposed pipeline and highway routes are 9 and 13 miles west of the site, respectively.

Material: Shale and siltstone.

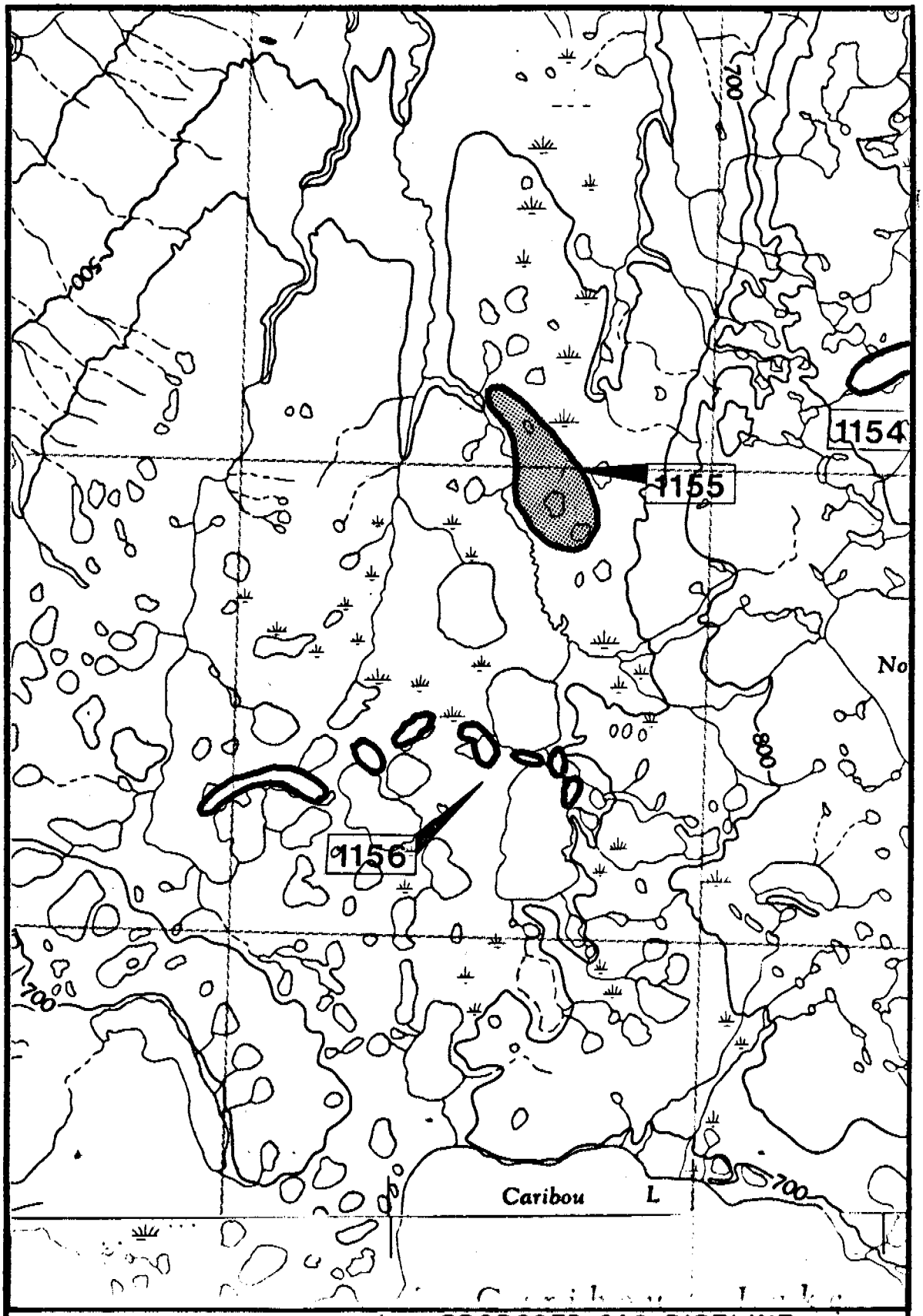
Assessment: Eight to 9 feet of frozen clayey silt overburden overlie firm, dry silty shale which could serve as fair quality general fill. Haulage distance to the proposed highway route is long and access crosses



□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A22935-178 SCALE: 1" = 3000' (approx.)

thermally sensitive terrain thereby necessitating winter operations. A drilling program will be necessary to prove the deposit. Site 1155 is a good prospect for a source of shale borrow; however, the long haulage distance renders the feasibility of developing the site questionable.



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: ARTIC RED RIVER 106-N
AKLAVIK 107-B

SCALE: 1:125,000

SITE 1155

ENVIRONMENTAL SENSITIVITY INDEX

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	TERRAIN 1 2 3 4 5 Rating: 5	Formation Stability Ice Content	Flat Land, Terrace, Knoll, Rolling, Outcrop, Ridge, Scarp, Overburden Type & Depth, Wet Site, Dry Site.
5	VEGETATION 1 2 3 4 5 Rating: 15	Aesthetic Value Habitat Value	Marsh Black Spruce Muskeg White Spruce Mixed Conifer Conifer - Deciduous Deciduous Dry Slopes Riparian
15	MAMMALS 1 2 3 4 5 Rating: 60	Ungulates Furbearers Carnivores Small Mammals	Winter Range, Summer Range, Migration Route, Denning Area, Dams and Lodges, Special Habitat Use.
10	BIRDS 1 2 3 4 5 Rating: 20	Waterfowl-Swans, Geese, Ducks Game Birds Raptors Shorebirds Passerine	Migration Pathway, Moulting, Spring Staging, Fall Staging, Nesting-Brooding, Perching, Winter Habitat.
10	FISHERY 1 2 3 4 5 Rating: 20	Lakes, Tributaries Mackenzie River: Whitefish / Smelt Grayling / Sculpin Pike / Goldeye Trout-Perch / Chub Lake Trout / Dace Burbot / Walleye Suckers / Char Stickleback / Cisco	Spawning, Nursery, Feeding, Overwintering. Major Migration Route. Siltation of Spawning Areas, Benthic Communities, Toxic Material Spill, Slumps, Velocity Increments, Migration Barriers, Eutrophication, Blasting.
5	ARCHAEOLOGY 1 2 3 4 5 Rating: 10	Paleontology Pre-Historic Historic	Probability of Discovery. Low, Medium, High. Known Sites.
10	AESTHETICS 1 2 3 4 5 Rating: 10	Visible from: Physical Disturbance	River, Highway, Air. Dust, Waste, Stockpiles, Noises.
15	RESOURCE UTILIZATION 1 2 3 4 5 Rating: 45	Fort Good Hope Arctic Red R. Inuvik	Improved Access. Traplines. Hunting. Fishing. Domestic. Commercial.
15	ASSOCIATED DISTURBANCES 1 2 3 4 5 Rating: 75	Access Roads Miles From Highway Miles From Pipeline Hydrologic Alterations Continued Use For Maintenance.	0-2, 2-5, 5-10, 10+ 0-2, 2-5, 5-10, 10+ Cuts and Fills, Creek Crossings, Compaction, Slumping, Erosion. Stockpiles, Waste, Dust.
10	RESTORATION 1 2 3 4 5 Rating: 20	Soil Stabilization Visual Improvement Habitat Replacement	Natural Regeneration. Grass-Legume Seeding. Transplants. Sustained Maintenance. Erosion Control Systems.

R.I.R. - Relative Importance Units - Base of 100 units.

NOTE: SENSITIVITY INDEX RANGE

MINIMAL SENSITIVITY		MAXIMUM SENSITIVITY
100	TO	500

TOTAL INDEX: 280

SPECIAL CONCERNS: Upland area with lakes nearby and within Barren-Ground Caribou winter range. Avoid damage to lichens, or interference with wintering animals.

F.F. SLANEY & COMPANY LIMITED
VANCOUVER, B. C.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1155 HOLE NO. 3 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
1			Vs/Vr		1
2				119	2
3	ML	SILT (OL) brown clayey with organic silt			3
4				50	4
5		-trace sand and fine gravel (till)			5
6					6
7			Nbn		7
8					8
9					9
10					10
11	br	SILTSTONE (hard) grey interbedded and shale (soft)			11
12					12
13					13
14					14
15					15
16					16
17					17

DATE DRILLED: Mar 26/72 LOGGED BY: MVPL 72C-142 COMPLETION DEPTH: 17'

DRILLING METHOD: Failing 200 Air THAW DEPTH: N/A

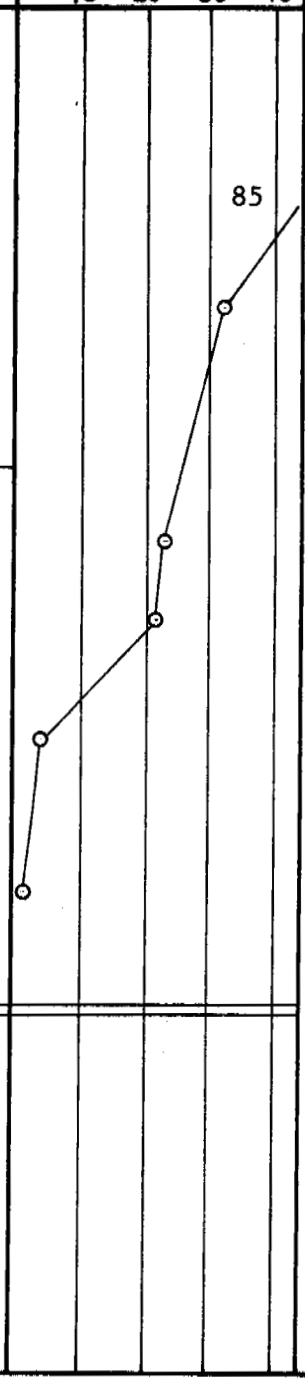
GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1155 HOLE NO. 1 PAGE 1 OF 1

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION
	PT	PEAT brown fibrous	Vx
1			
2	ML	SILT brown clayey	
3			
4			
5			
6			
7	ML	SILT brown clayey with sand (till)	Nbn
8			
9	br	SHALE (firm) grey silty	
10			
11			
12			
13			
14			
15			
16			
17			



DEPTH (feet): 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

DATE DRILLED: Mar. 26/72

LOGGED BY: MVPL 72C-140

COMPLETION DEPTH: 13'

DRILLING METHOD: Failing 200 Air

THAW DEPTH: N/A

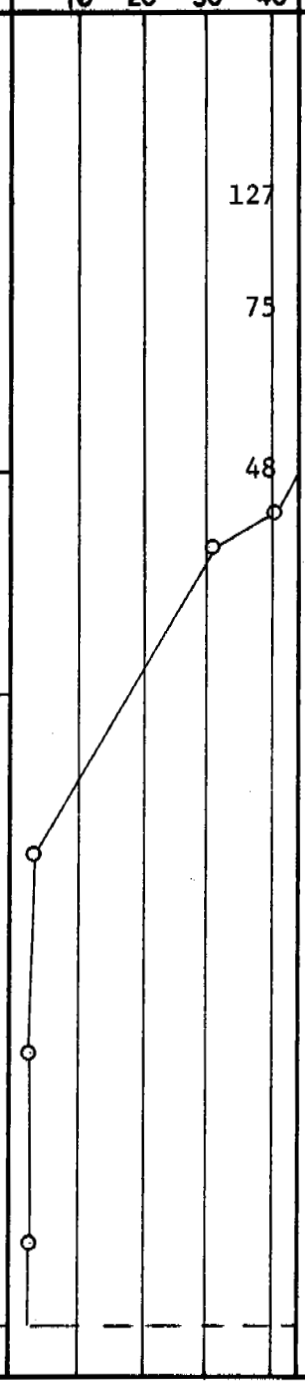
GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY – STAGE III

SITE NO. 1155 HOLE NO. 2 PAGE 1 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION
1–2	OL	SILT brown organic	Vr
2–9	ML	SILT brownish grey clayey with fine sand	Vr
9–17	br	SHALE (firm) grey silty	Nbn



DATE DRILLED: Mar 26/72 | LOGGED BY: MVPL 72C-141 | COMPLETION DEPTH: 20'

DRILLING METHOD: Failing 1000 Air | THAW DEPTH: N/A

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

EBA Engineering Consultants Ltd.

GRANULAR MATERIALS INVENTORY - STAGE III

SITE NO. 1155 HOLE NO. 2 PAGE 2 OF 2

DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT % (10 20 30 40)	DEPTH (feet)
18	br	SHALE (firm) grey silty	Nbn		18
19					19
20					20
21					21
22					22
23					23
24					24
25					25
26					26
27					27
28					28
29					29
30					30
31					31
32					32
33					33
34					34

DATE DRILLED: Mar. 26/72 LOGGED BY: MVPL 72C-141 COMPLETION DEPTH: 20'

DRILLING METHOD: Failing 1000 Air THAW DEPTH: N/A

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN
AND NORTHERN AFFAIRS

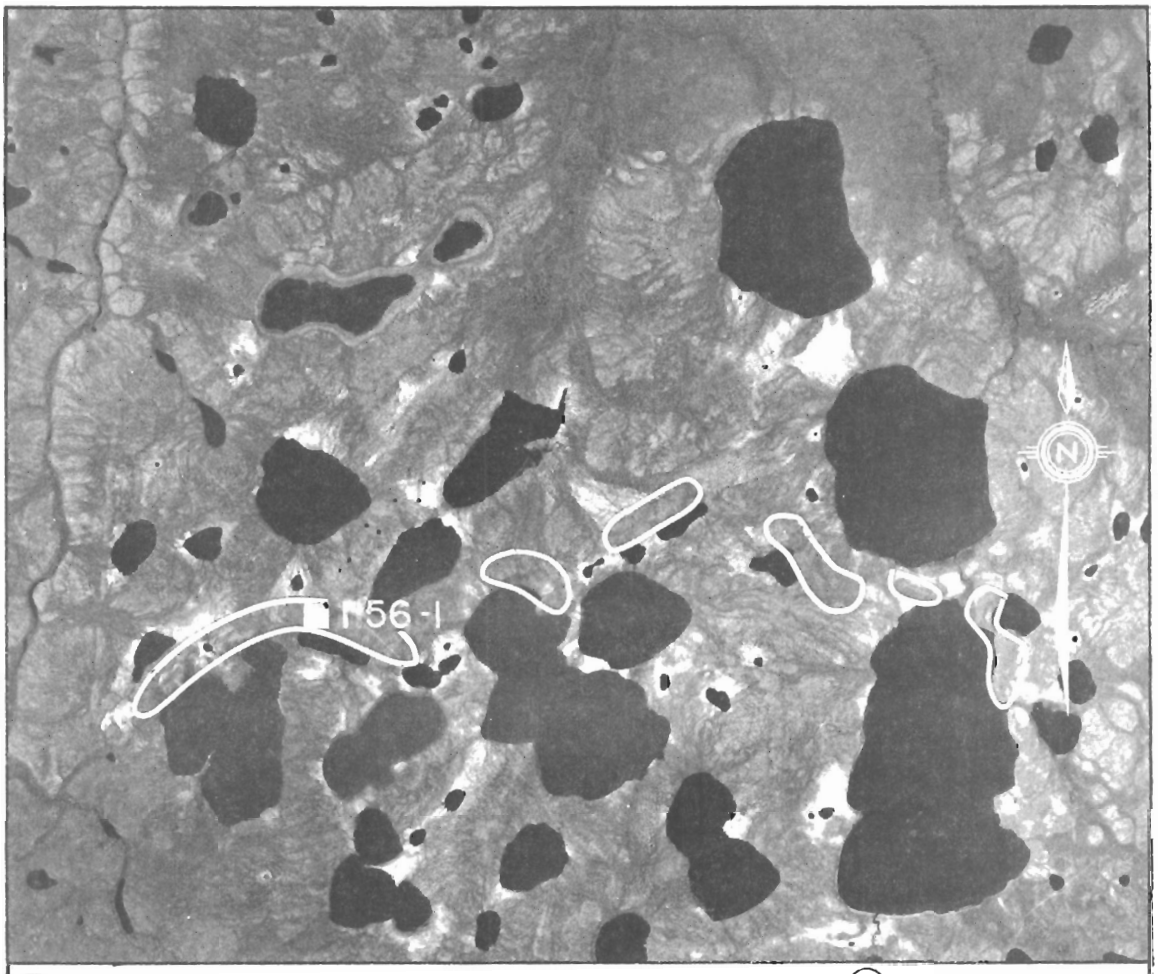
EBA Engineering Consultants Ltd.

SITE 1156a

Location: Site 1156 is located 5 1/2 miles NNW of the north shore of Caribou Lake. The proposed highway route is 10 miles to the west of the site and the pipeline route is 5 miles to the west of the site.

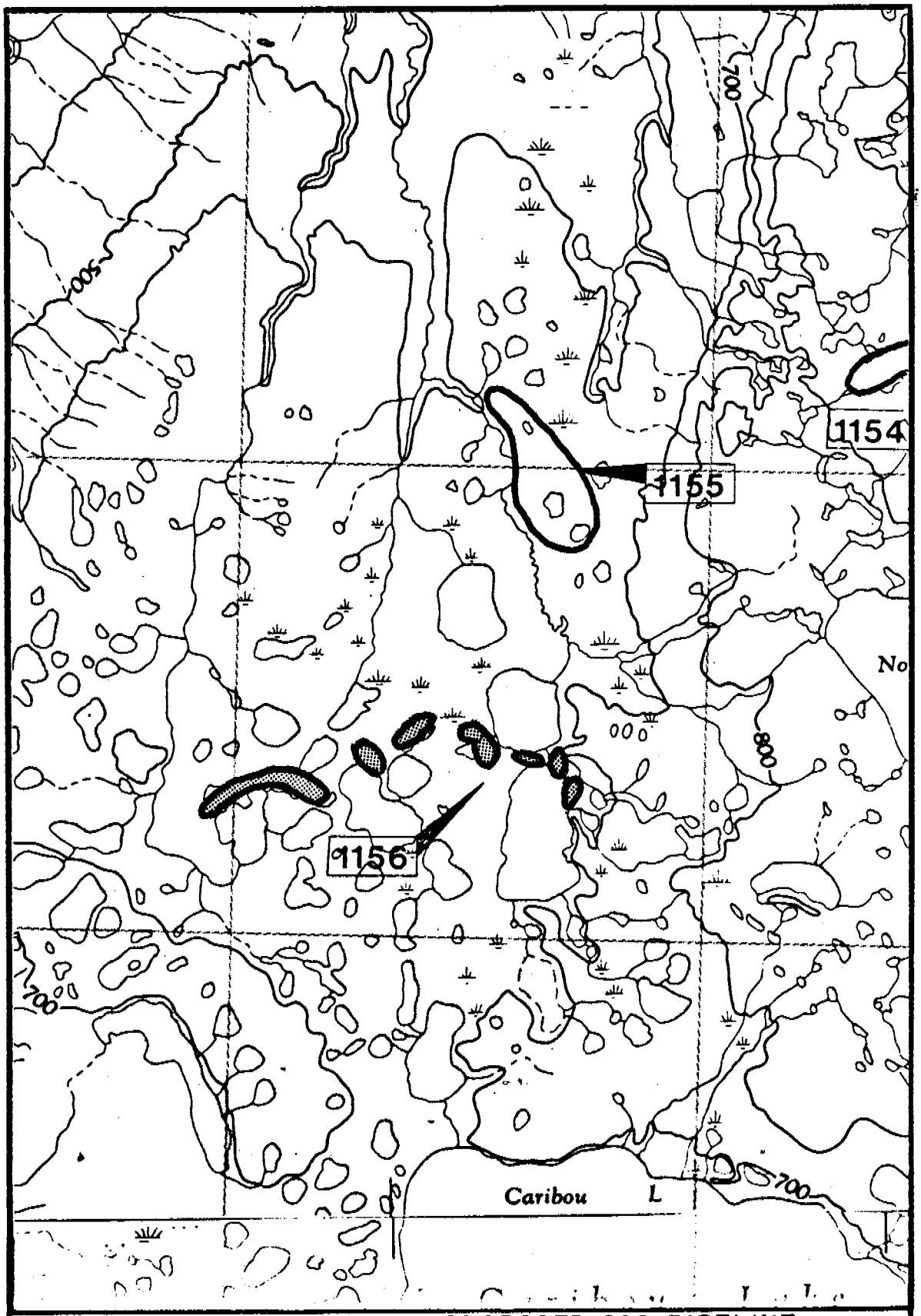
Material: Silt and sand with occassional gravel, variable composition.

Assessment: The material at site 1156 is unsuitable for use in construction. The site is not recommended for development.



□ TEST PIT ○ BOREHOLE

AIRPHOTO No. A21583-214 SCALE: 1" = 5500' (approx)



SITE LIMITS

PROPOSED GAS PIPELINE

PROPOSED MACKENZIE HIGHWAY

MAPS: ARTIC RED RIVER 106-N
AKLAVIK 107-B

SCALE: 1:125,000

SITE 1156

ENVIRONMENTAL SENSITIVITY INDEX

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	TERRAIN 1 2 (3) 4 5 Rating: 15	Formation Stability Ice Content	Flat Land, Terrace, Knoll, Rolling, Outcrop, Ridge, Scarp, Overburden Type & Depth, Wet Site, Dry Site.
5	VEGETATION 1 2 (3) 4 5 Rating: 15	Aesthetic Value Habitat Value	Marsh Black Spruce Muskeg White Spruce Mixed Conifer Conifer - Deciduous Deciduous Dry Slopes Riparian
15	MAMMALS 1 2 (3) 4 5 Rating: 45	Ungulates Furbearers Carnivores Small Mammals	Winter Range, Summer Range, Migration Route, Denning Area, Dams and Lodges, Special Habitat Use.
10	BIRDS 1 (2) 3 4 5 Rating: 20	Waterfowl-Swans, Geese, Ducks Game Birds Raptors Shorebirds Passerine	Migration Pathway, Moulting, Spring Staging, Fall Staging, Nesting-Brooding, Perching, Winter Habitat.
10	FISHERY 1 (2) 3 4 5 Rating: 20	Lakes, Tributaries Mackenzie River: Whitefish, Grayling, Pike, Trout-Perch, Lake Trout, Burbot, Suckers, Stickleback Smelt, Sculpin, Goldeye, Chub, Dace, Walleye, Char, Cisco	Spawning, Nursery, Feeding, Overwintering. Major Migration Route. Siltation of Spawning Areas, Benthic Communities. Toxic Material Spill. Slumps, Velocity Increments, Migration Barriers. Eutrophication. Blasting.

R.I.R.	QUALITY ASSESSMENT	PARAMETERS	ELEMENTS
5	ARCHAEOLOGY 1 (2) 3 4 5 Rating: 10	Paleontology Pre-Historic Historic	Probability of Discovery. Low, Medium, High. Known Sites.
10	AESTHETICS (1) 2 3 4 5 Rating: 10	Visible from: Physical Disturbance	River, Highway, Air. Dust, Waste, Stockpiles, Noises.
15	RESOURCE UTILIZATION 1 2 (3) 4 5 Rating: 45	Fort Good Hope Arctic Red R. Inuvik	Improved Access, Traplines, Hunting, Fishing, Domestic, Commercial.
15	ASSOCIATED DISTURBANCES 1 2 3 (4) 5 Rating: 60	Access Roads Miles From Highway Miles From Pipeline Hydrologic Alterations Continued Use For Maintenance.	0-2, 2-5, 5-10, 10+ 0-2, 2-5, 5-10, 10+ Cuts and Fills, Creek Crossings, Compaction, Slumping, Erosion. Stockpiles, Waste, Dust.
10	RESTORATION (1) 2 3 4 5 Rating 10	Soil Stabilization Visual Improvement Habitat Replacement	Natural Regeneration, Grass-Legume Seeding, Transplants, Sustained Maintenance, Erosion Control Systems.

R.I.R. - Relative Importance Units - Base of 100 units.

NOTE: SENSITIVITY INDEX RANGE

MINIMAL SENSITIVITY		MAXIMUM SENSITIVITY
100	TO	500

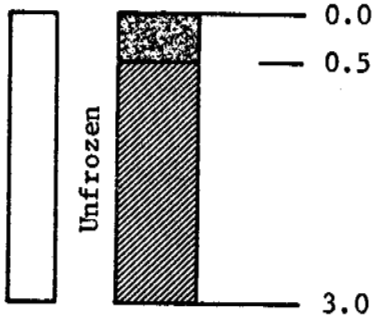
TOTAL INDEX: 250

SPECIAL CONCERNS: **Upland area in Rabbit Hay drainage.**

F.F. SLANEY & COMPANY LIMITED
VANCOUVER, B. C.

TEST PIT LOG

TP 1156-1



Moss

Clay, fractured sandstone
silty
moist
grey