GEOLOGICAL SURVEY OF CANADA
OPEN FILE 7289

Digital Compilation of the Surficial Sediments of the Mackenzie Valley corridor, Yukon Coastal Plain, and the Tuktoyaktuk Peninsula

M.M. Côté, C. Duchesne, J.F. Wright and M. Ednie

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Publications in this series have not been edited; they are released as submitted by the author.

ABSTRACT

This Geological Survey of Canada Open File presents a digital compilation of previously published surficial geology maps at 1:125,000 and 1:250,000 scale for the Mackenzie River valley, Northwest Territories. The data compilation is presented in ESRI® shapefile format and solely identifies surficial materials. The compilation was used as a data source to parameterize surficial materials for ground thermal modeling in the Mackenzie River valley.

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1. INTRODUCTION

This Geological Survey of Canada (GSC) Open File contains digital versions of paper surficial geology maps at a scale of 1:125,000 for the Mackenzie Valley Corridor, NWT (Fig. 1). The maps were digitized for use in the GSC's ground thermal modeling database for the Mackenzie valley. The maps complement the existing 1:250,000 surficial geology coverage compiled by Aylsworth *et al*. (2000) for this area that has yet to be published. A sample of the dataset for the Fort Simpson area (095H) with simplified legend information is presented in Figure 2.

2. DIGITIZING PROCESS

All paper maps were scanned and digitized by Access Technologies (AT) under contracts between 2001 and 2003. Digital copies of the scanned paper maps are included in this open file as Tagged Image File (.tif) and are located in Data section under Images The attributes information describing the surficial geology characteristics associated with each polygon was quite complex, therefore AT entered the information in one field in the database following a well-defined set of rules. This information was then parsed manually in a spreadsheet into field columns by the GSC.

Each polygon was checked for spatial and attribute accuracy. All polygons were verified for overlaps, voids, and multi-parts using the Quality Control extension in ArcView GIS. Edge matching of map sheets was conducted when legend information was the same between maps, which resulted in seven shapefiles covering the mapped area. A dissolve process in Arcview (aggregates polygons based on specific attributes) was then conducted on each merged file to identify and merge adjacent polygons with the same attributes. Finally, the bounding edges were snapped to the borders of the NTDB neatlines.

Some changes in the original legend symbology were made to ensure consistency amongst the map sheets as well a unique legend item for each class. Geo-referenced images (.tif files) of the scanned maps are included.

3. DIGITAL DATABASE FORMAT

The database is comprised of seven shapefiles (Fig. 3). All available 1:125,000 scale data in the corridor were digitized. Unfortunately, for some mapsheets, this data does not exist therefore the gaps were filled with 1:250,000 data from Aylsworth et al. (2000). This section provides a summary and metadata of the seven shapefiles and includes legend information.

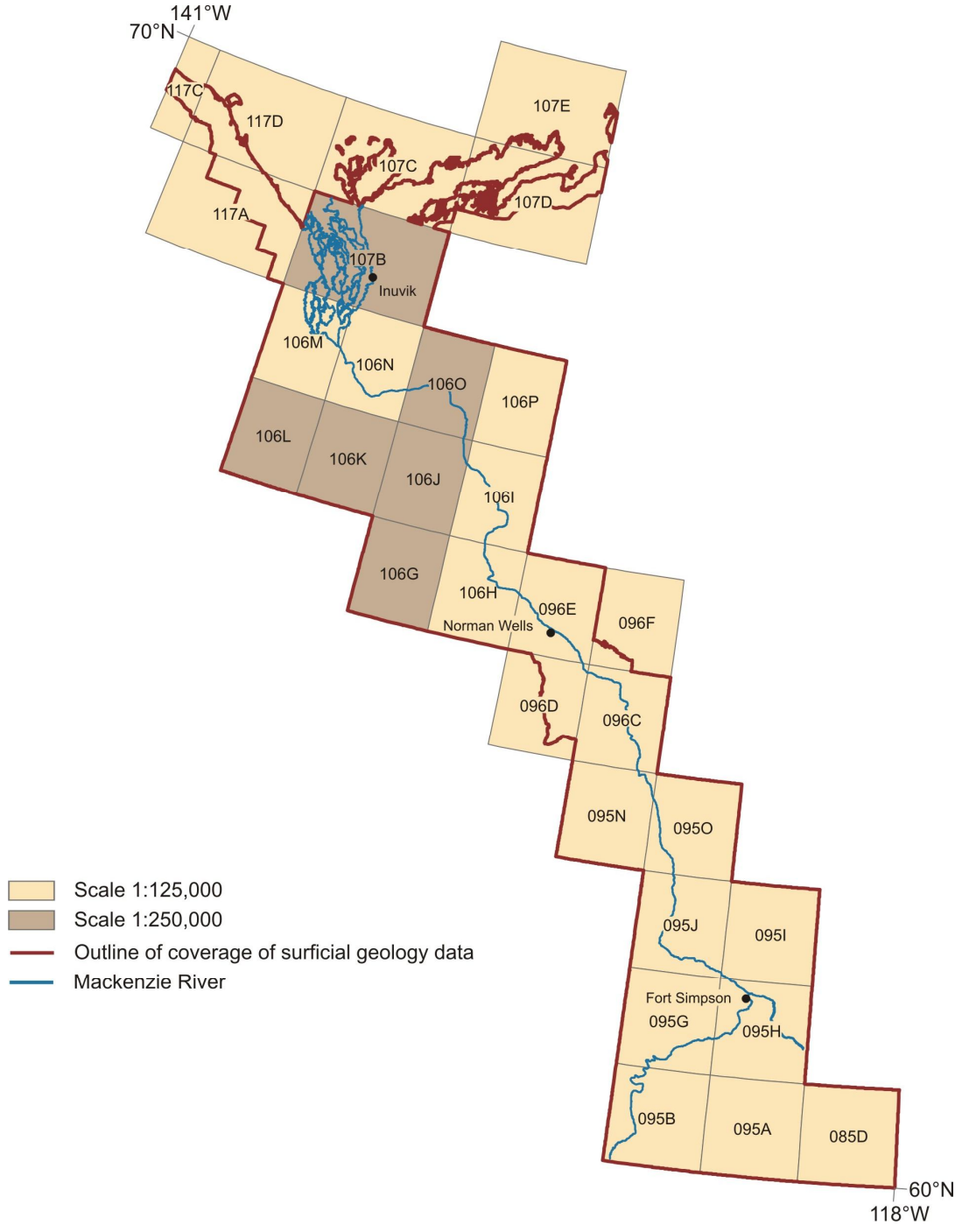

Figure 1: Outline of coverage of digital surficial sediment data, including National Topographic System (NTS) map sheet information and spatial scale of the data.

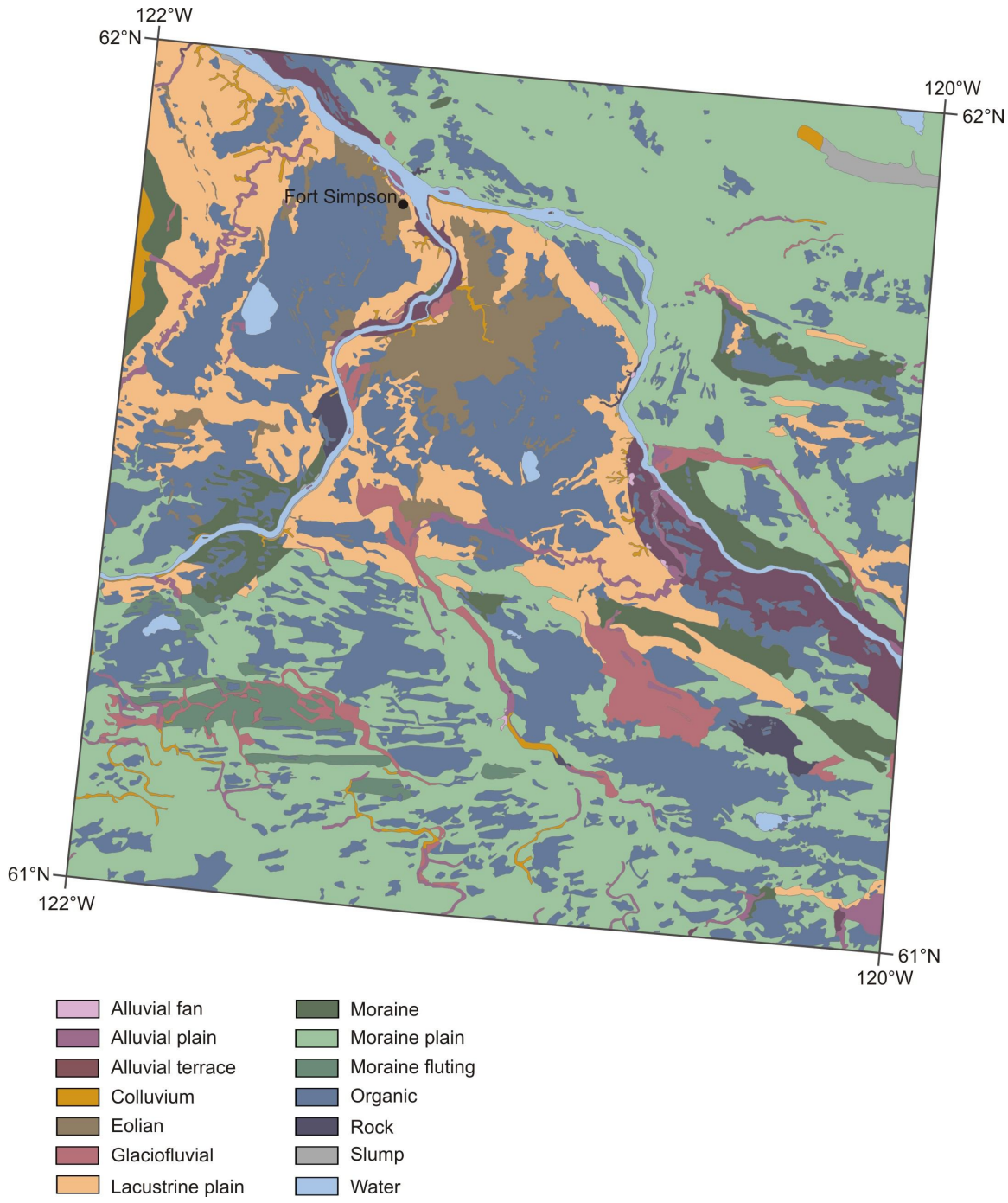

Figure 2: Sample of digital surficial sediments data for the Fort Simpson area. Note that the data are classified for dominant genetic unit only in this example.

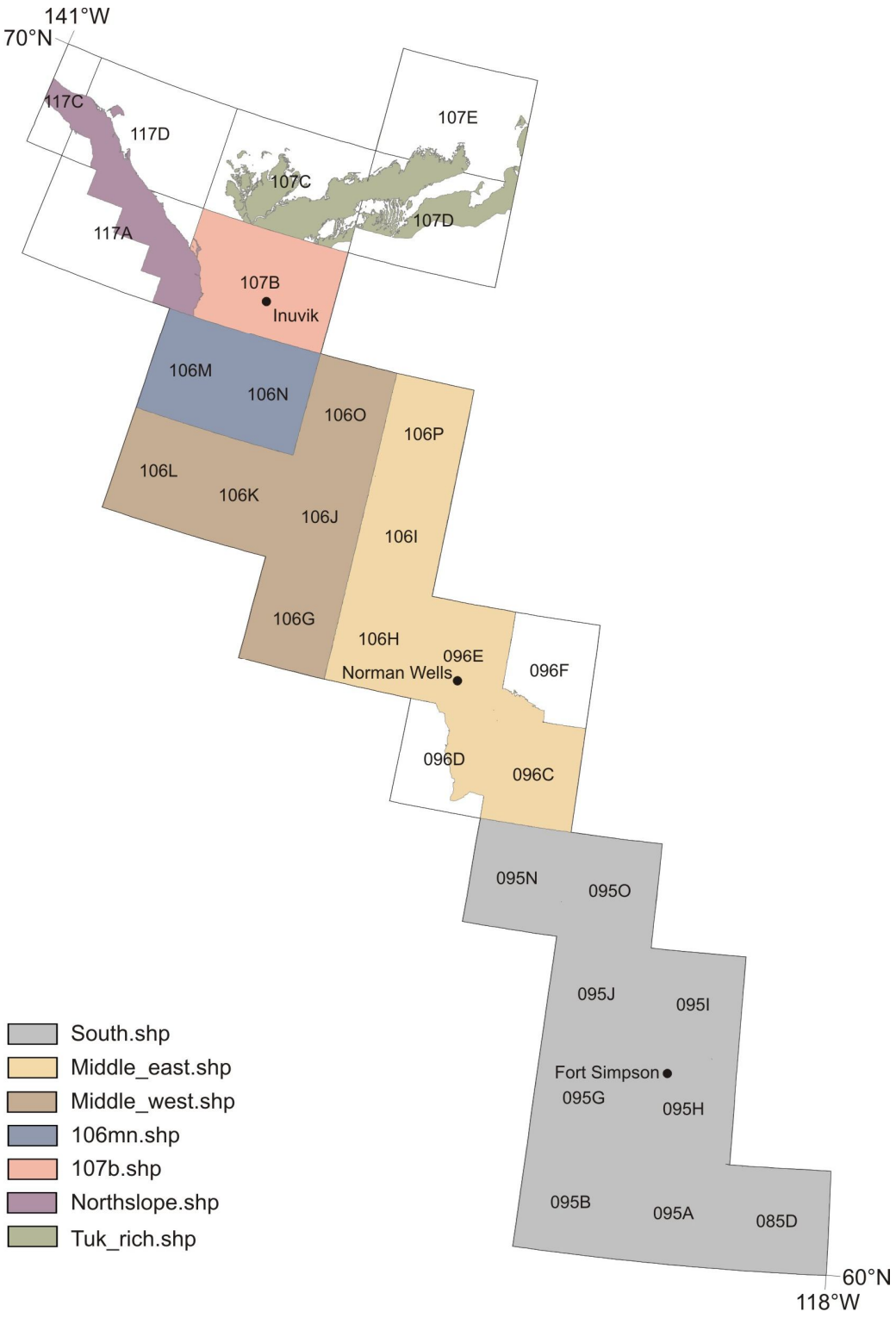

Figure 3: Summary of surficial sediments coverage contained in each of the seven ESRI® shapefiles in the database.

3.1. Scale 1:125,000

3.1.1. Southern portion of the Mackenzie River valley

File Description and Map Projection

File format (entity type)	Shapefile (polygon)
File name	South.shp
File description	Surficial sediments of the southern portion of the Mackenzie River valley
File location	\Data\Shapefiles\Scale125000\
Number of records	14355

Projection	Lambert Conformal Conic
Ellipsoid	GRS 80
Central Meridian	115°W
Reference Latitude	0°N
1st Standard Parallel	60°N
2nd Standard Parallel	66°N
False Easting	0 m
False Northing	0 m

Map Sheets

085D, 095A, 095B, 095G, 095H, 095I, 095J, 095N, and 095O

Hardcopy Reference

085D

Rutter, N.W., and Boydell, A.N.

1979: Surficial geology and geomorphology, Kakisa River, District of Mackenzie; Geological Survey of Canada, Preliminary Map 14-1978, scale 1:125,000.

095A

Rutter, N.W., Minning, G.V., and Netterville, J.A.

1980: Surficial geology and geomorphology, Trout Lake, District of Mackenzie; Geological Survey of Canada, Preliminary Map 16-1978, scale 1:125,000.

095B

Hawes, R.J.

1980: Surficial geology and geomorphology, Fort Liard, District of Mackenzie; Geological Survey of Canada, Preliminary Map 11-1979, scale 1:125,000.

095G

Rutter, N.W., and Boydell, A.N.

1981: Surficial geology and geomorphology, Sibbeston Lake, District of Mackenzie; Geological Survey of Canada, Preliminary Map 10-1979, scale 1:125,000.

095H
Rutter, N.W., Minning, G.V., and Netterville, J.A.
1980: Surficial geology and geomorphology, Fort Simpson, District of Mackenzie; Geological Survey of Canada, Preliminary Map 3-1978, scale 1:125,000.

095I
Hawes, R.J.
1980: Surficial geology and geomorphology, Bulmer Lake, District of Mackenzie; Geological Survey of Canada, Preliminary Map 10-1978, scale 1:125,000.

095J
Hawes, R.J.
1980: Surficial geology and geomorphology, Camsell Bend, District of Mackenzie; Geological Survey of Canada, Preliminary Map 9-1978, scale 1:125,000.

095N
Rutter, N.W., Minning, G.V., and Netterville, J.A.
1980: Surficial geology and geomorphology, Dahadinni River, District of Mackenzie; Geological Survey of Canada, Preliminary Map 18-1978, scale 1:125,000.

095O
Rutter, N.W. and Boydell, A.N.
1980: Surficial geology and geomorphology, Wrigley Lake, District of Mackenzie; Geological Survey of Canada, Preliminary Map 13-1978, scale 1:125,000.

Attribute Field Names

Shape	Identifies shape type in ArcView. (Field is required by the software)
Recno	Record number of each polygon
D_gene	Genetic class of the dominant surficial unit
D_txt1	First soil texture associated with the dominant surficial unit
D_txt2	Second soil texture associated with the dominant surficial unit
D_per	Percent of secondary surficial unit within the complex units
V_gene	Genetic class of the veneer surficial unit
V_txt1	First soil texture associated with the veneer surficial unit
V_txt2	Second soil texture associated with the veneer surficial unit
V_per	Percent of secondary veneer unit within the complex veneer
S_gene	Genetic class of the secondary surficial unit
S_txt1	First soil texture associated with the secondary surficial unit
S_txt2	Second soil texture associated with the secondary surficial unit
S_per	Percent of other surficial unit within the complex secondary unit

Map Unit Designation – Surficial Materials

Genetic Category

A	Alluvial
C	Colluvial
E	Eolian

G Glaciofluvial
L Lacustrine
M Morainal
O Organic
P Piedmont
R Bedrock
S Slump
U Upland

Texture
b Boulders
c Clay
f Fen
g Gravel
o Organic
p Peat
r Rock and rubble
s Sand
$ Silt
sh Shale
ss Sandstone
t Till

Morphology
b Beach
c Channeled
d Drumlinoid
e Eroded
f Fan
h Hummocky
k Kettled (glaciofluvial) or thermokarst (glaciolacustrine or alluvial)
m Rolling
p Plain
r Ridged
s Striated (i.e. fluted)
t Terrace
v Veneer (<1.5 m thick)
x Complex

Percent
1 Unknown percentage of second unit
2 With 5-15% of the second unit
3 With 16-49% of the second unit
4 No second unit present

Map Unit Designation – Bedrock and Mountain Terrain
Topographic Symbol
M Mountain, local relief greater than 450 m
H High hill, local relief 150-450 m
L Low hill, local relief 30-150 m

Bedrock

Ch	Chert
Cg	Conglomerate
D	Dolomite
L	Limestone
Mu	Mudstone
S	Sandstone
Sh	Shale
Si	Siltstone

Slope Angle

1	<5°
2	5-15°
3	15-35°
4	>35°

Morphological Modifier

d	dissected

3.1.2. Eastern portion of the middle of the Mackenzie River valley

File Description and Map Projection

File format (entity type)	Shapefile (polygon)
File name	Middle_east.shp
File description	Surficial sediments of the eastern portion of the middle Mackenzie River valley
File location	\Data\Shapefiles\Scale125000\
Number of records	9539

Projection	Lambert Conformal Conic
Ellipsoid	GRS 80
Central Meridian	115°W
Reference Latitude	0°N
1st Standard Parallel	60°N
2nd Standard Parallel	66°N
False Easting	0 m
False Northing	0 m

Map Sheets

096C, 096D, 096E, 096F, 106H, 106I, and 106P

Hardcopy Reference

096C, 096D, 096E, and 106H

Hanley, P.T., Hodgson, D.A., Hughes, O.L., Kurfurst, P.K., Lawrence, D.E., Zoltai, S.C., Pettapiece, W.W., and Pilon, J.

1973: Four surficial geology and geomorphology maps of Fort Norman, Carcajou Canyon, Norman Wells, and Sans Sault Rapids map areas, Mackenzie Valley; Geological Survey of Canada, Open File 155, scale 1:125,000.

096F and 106P

Chatwin, S.C., Hanley, P.T., Hughes, O.L., and Pilon, J.

1975: Surficial geology and geomorphology maps of Norman Wells, Mahony Lake, Canot Lake, District of Mackenzie, maps and legend; Geological Survey of Canada, Open File 294, scale 1:125,000.

106I

Hughes, O.L., Hodgson, D.A., and Pilon, J.

1972: Surficial geology, Fort Good Hope, Arctic Red River, Fort McPherson, District of Mackenzie, maps and legend; Geological Survey of Canada, Open File 97, scale 1:125,000.

Attribute Field Names

Shape	Identifies shape type in ArcView. (Field is required by the software)
Recno	Record number of each polygon
D_gene	Genetic class of the dominant surficial unit
D_txt1	First soil texture associated with the dominant surficial unit
D_txt2	Second soil texture associated with the dominant surficial unit
D_per	Percent of secondary surficial unit within the complex units
V_gene	Genetic class of the veneer surficial unit
V_txt1	First soil texture associated with the veneer surficial unit
V_txt2	Second soil texture associated with the veneer surficial unit
V_per	Percent of secondary veneer unit within the complex veneer
S_gene	Genetic class of the secondary surficial unit
S_txt1	First soil texture associated with the secondary surficial unit
S_txt2	Second soil texture associated with the secondary surficial unit
S_per	Percent of other surficial unit within the complex secondary unit

Map Unit Designation – Surficial Materials

Genetic Category

A	Alluvial
C	Colluvial
E	Eolian
G	Glaciofluvial
L	Lacustrine
M	Morainal
O	Organic
P	Piedmont

R	Bedrock
S	Slump
U	Upland
X	Undifferentiated or unknown

Texture

b	Boulders
c	Clay
f	Fen
g	Gravel
o	Organic
p	Peat
r	Rock and rubble
s	Sand
$	Silt
sh	Shale
ss	Sandstone
t	Till

Morphology

b	Beach
c	Channeled
d	Drumlinoid
e	Eroded
f	Fan
h	Hummocky
k	Kettled (glaciofluvial) or thermokarst (glaciolacustrine or alluvial)
m	Rolling
p	Plain
r	Ridged
s	Striated (i.e. fluted)
t	Terrace
v	Veneer (<1.5 m thick)
x	Complex

Percent

1	Unknown percentage of second unit
2	With 5-15% of the second unit
3	With 16-49% of the second unit
4	No second unit present

3.1.3. Mapsheets 106M and 106N of the Mackenzie River valley

File Description and Map Projection

File format (entity type)	Shapefile (polygon)
Filename	106mn.shp
File description	Surficial sediments of NTS map sheets 106m (Fort McPherson)

	and 106n (Arctic Red River) of the Mackenzie River Valley
File location	\Data\Shapefiles\Scale125000\
Number of records	3155
Projection	Lambert Conformal Conic
Ellipsoid	GRS 80
Central Meridian	115°W
Reference Latitude	0°N
1st Standard Parallel	60°N
2nd Standard Parallel	66°N
False Easting	0 m
False Northing	0 m

Map Sheets
106M, and 106N

Hardcopy Reference
106M, and 106N
Hughes, O.L., Hodgson, D.A., and Pilon, J.
1972: Surficial geology, Fort Good Hope, Arctic Red River, Fort McPherson, District of Mackenzie, maps and legend; Geological Survey of Canada, Open File 97, scale 1:125,000.

Attribute Field Names

Shape	Identifies shape type in ArcView. (Field is required by the software)
Recno	Record number of each polygon
D_gene	Genetic class of the dominant surficial unit
D_txt1	First soil texture associated with the dominant surficial unit
D_txt2	Second soil texture associated with the dominant surficial unit
D_per	Percent of secondary surficial unit within the complex units
V_gene	Genetic class of the veneer surficial unit
V_txt1	First soil texture associated with the veneer surficial unit
V_txt2	Second soil texture associated with the veneer surficial unit
V_per	Percent of secondary veneer unit within the complex veneer
S_gene	Genetic class of the secondary surficial unit
S_txt1	First soil texture associated with the secondary surficial unit
S_txt2	Second soil texture associated with the secondary surficial unit
S_per	Percent of other surficial unit within the complex secondary unit

Map Unit Designation – Surficial Materials
Genetic Category
A Alluvial
C Colluvial

E Eolian
G Glaciofluvial
M Morainal
O Organic
P Piedmont
R Bedrock
U Upland

Morphology:
c Channeled
d Drumlinoid
f Fan
h Hummocky
k Kettled (glaciofluvial) or thermokarst (glaciolacustrine or alluvial)
m Rolling
p Plain
r Ridged
s Striated (i.e. fluted)
t Terrace
v Veneer (<1.5 m thick)
x Complex

Texture
b Boulders
c Clay
f Fen
g Gravel
p Peat
o Organic
s Sand
sh Shale
$ Silt
ss Sandstone
t Till

Percent
1 Unknown percentage of second unit (represented by + on map)
2 With 5-15% of the second unit (represented by / on map)
3 With 16-49% of the second unit (represented by – on map)
4 No second unit present

Map Unit Designation – Bedrock and Mountain Terrain
Topographic Symbol
M Mountain, local relief greater than 450 m
H High hill, local relief 150-450 m
L Low hill, local relief 30-150 m

Bedrock
Ch Chert
Cg Conglomerate

D	Dolomite
L	Limestone
Mu	Mudstone
S	Sandstone
Sh	Shale
Si	Siltstone

Slope Angle

1	<5°
2	5-15°
3	15-35°
4	>35°

Morphological Modifier

d	dissected

3.1.4. North slope of the Mackenzie River valley/Yukon Coastal plain

File Description and Map Projection

File format (entity type)	Shapefile (polygon)
File name	Northslope.shp
File description	Surficial sediments of the North slope of the Mackenzie River valley and the Yukon Coastal plain
File location	\Data\Shapefiles\Scale125000\
Number of records	1200

Projection	Lambert Conformal Conic
Ellipsoid	GRS 80
Central Meridian	115°W
Reference Latitude	0°N
1st Standard Parallel	60°N
2nd Standard Parallel	66°N
False Easting	0 m
False Northing	0 m

Map Sheets

107B, 117A, 117C, and 117D

Hardcopy Reference

107B, 117A, 117C, and 117D

Rampton, V.N.

1974 : Surficial geology, Aklavik, Blow River, Demarcation Point, Herschel Island, District of Mackenzie, maps and legend; Geological Survey of Canada, Open File 191, scale 1:125,000.

Attribute Field Names

Shape	Identifies shape type in ArcView. (Field is required by the software)
Recno	Record number of each polygon
Gen_cat	Genetic class of the surficial unit
Gen_mod	Genetic modifier of the surficial unit
Mor_mod	Morphological modifier of the surficial unit
Txt_mod	Textural modifier of the surficial unit
Veneer	Veneer overlying the surficial unit
Notes	Information on depth to bedrock and/or thickness of organic cover

Map Unit Designation – Surficial Materials

Genetic Category

C Colluvial
F Fluvial
G Glaciofluvial
L Lacustrine
M Morainal
Y Marine

Genetic Modifiers

A Active deposition
F Fluvial
G Glacial
K Thermokarst
1 Floodplain and low-level terrace
3 Intermediate level terrace
4 High level terrace
5 Pediment level

Morphological Modifiers

b Beach
e Eroded
f Fan
g Glaciated
h Hummocky
k Thermokarst
m Rolling
p Plain
r Ridged
t Terrace

1	Slope of <5°
2	Slope of 5-15°
3	Slope of >15°

Textural Modifiers

c	Clay
coarse	Sand or gravel
fines	Clay, silt or fine sand
g	Gravel
b	Bouldery rubble
s	Sand

3.1.5. Tuktoyaktuk Peninsula and Richards Island

File Description and Map Projection

File format (entity type)	Shapefile (polygon)
Filename	Tuk_rich.shp
File description	Surficial sediments of Tuktoyaktuk Peninsula and Richards Island
File location	\Data\Shapefiles\Scale125000\
Number of records	2462

Projection	Lambert Conformal Conic
Ellipsoid	GRS 80
Central Meridian	115°W
Reference Latitude	0°N
1st Standard Parallel	60°N
2nd Standard Parallel	66°N
False Easting	0 m
False Northing	0 m

Map Sheets

107C, 107D, and 107E

Hardcopy Reference

107C, 107D, and 107E

Rampton, V.N.

1972 : Surficial geology and landforms, Malloch Hill, Mackenzie Delta, Stanton, Cape Dalhousie, maps and legend; Geological Survey of Canada, Open File 96, scale 1:125,000.

Attribute Field Names

Shape	Identifies shape type in ArcView. (Field is required by the software)

Recno	Record number of each polygon
Gen_cat	Genetic class of the surficial unit
Gen_mod	Genetic modifier of the surficial unit
Mor_mod	Morphological modifier of the surficial unit
Txt_mod	Textural modifier of the surficial unit
Veneer	Veneer overlying the surficial unit

Map Unit Designation – Surficial Materials

Genetic Category

C Colluvial
E Eolian
F Fluvial
L Lacustrine
M Morainal
O Organic
R Bedrock
X Undifferentiated or unknown
Y Marine

Genetic Modifiers

G Glacial
Z Responsible genetic process still actively affecting area

Morphological Modifiers

e Eroded, gullied
f Fan
g Glaciated
h Hummocky
k Thermokarst
m Rolling
p Plain
r Ridged
t Terrace
v Veneer

Textural Modifiers

c Clay, clayey
g Gravel
$ Silt
s Sand
sh Shale

3.2. Scale 1:250,000

3.2.1. Western portion of the middle of the Mackenzie River valley

File Description and Map Projection

File format (entity type)	Shapefile (polygon)
File name	Middle_west.shp
File description	Surficial sediments of the western portion of the middle of the Mackenzie River valley
File location	\Data\Shapefiles\Scale250000\
Number of records	1900

Projection	Lambert Conformal Conic
Ellipsoid	GRS 80
Central Meridian	115°W
Reference Latitude	0°N
1st Standard Parallel	60°N
2nd Standard Parallel	66°N
False Easting	0 m
False Northing	0 m

Map Sheets

106G, 106J, 106K, 106L, and 106O

Hardcopy Reference

106G, 106J, 106K, 106L, and 106O

Aylsworth, J.M., Burgess, M.M., Desrochers, D.T., Duk-Rodkin, A., Roberston, T., and Traynor, J.A.

2000: Surficial geology, subsurface materials, and thaw sensitivity of sediments. *in* The Physical Environment of the Mackenzie Valley, Northwest Territories: A Base Line for the Assessment of Environmental Change, (ed.) L.D. Dyke and G.R. Brooks; Geological Survey of Canada, Bulletin 547, p.41-48.

Attribute Field Names

Shape	Identifies shape type in ArcView. (Field is required by the software)
Recno	Record number of each polygon
Polygon_at	Attributes as entered during the digitizing process

Map Unit Designation – Surficial Materials

Ap	Alluvial plain
At	Alluvial terrace
Af	Alluvial fan
C	Colluvium
Cz	Colluvial complex
E	Eolian ridges

Lpf	Lacustrine plain, fine grained sediments
Lpc	Lacustrine plain, coarse grained sediments
Lv	Lacustrine veneer
Gp	Glaciofluvial outwash plain
Gx	Glaciofluvial ice contact deposits
Mp	Moraine plain
Mb	Moraine blanket
Mv	Moraine veneer
Md	Drumlinoid plain
Mh	Hummocky moraine
R	Bedrock
Mar	Marine deposits
fpO	Fen dominant peatland
pfO	Bog dominant peatland

3.2.2. Mapsheet 107B of the Mackenzie River valley

File Description and Map Projection

File format (entity type)	Shapefile (polygon)
File name	107b.shp
File description	Surficial sediments of NTS map sheet 107b (Aklavik) of the Mackenzie River Valley
File location	\Data\Shapefiles\Scale250000\
Number of records	236

Projection	Lambert Conformal Conic
Ellipsoid	GRS 80
Central Meridian	115°W
Reference Latitude	0°N
1st Standard Parallel	60°N
2nd Standard Parallel	66°N
False Easting	0 m
False Northing	0 m

Map Sheets

107B

Hardcopy Reference

107B

Aylsworth, J.M., Burgess, M.M., Desrochers, D.T., Duk-Rodkin, A., Roberston, T., and Traynor, J.A.

2000: Surficial geology, subsurface materials, and thaw sensitivity of sediments. *in* The Physical Environment of the Mackenzie Valley, Northwest Territories: A Base Line for the Assessment of Environmental Change, (ed.) L.D. Dyke and G.R. Brooks; Geological Survey of Canada, Bulletin 547, p.41-48 (dataset not yet published).

Attribute Field Names

Shape	Identifies shape type in ArcView. (Field is required by the software)
Recno	Record number of each polygon
Polygon_at	Attributes as entered during the digitizing process

Map Unit Designation – Surficial Materials

Ap	Alluvial plain
At	Alluvial terrace
Af	Alluvial fan
C	Colluvium
Cz	Colluvial complex
E	Eolian ridges
Lpf	Lacustrine plain, fine grained sediments
Lpc	Lacustrine plain, coarse grained sediments
Lv	Lacustrine veneer
Gp	Glaciofluvial outwash plain
Gx	Glaciofluvial ice contact deposits
Mp	Moraine plain
Mb	Moraine blanket
Mv	Moraine veneer
Md	Drumlinoid plain
Mh	Hummocky moraine
R	Bedrock
Mar	Marine deposits
fpO	Fen dominant peatland
pfO	Bog dominant peatland

3.3. Basedata

3.3.1. Communities in Corridor

File Description and Map Projection

File format (entity type)	Shapefile (point)
File name	Towns
File description	Communities within the Mackenzie Valley Transportation Corridor
File location	\Data\Shapefiles\Basedata\

Projection	Lambert Conformal Conic
Ellipsoid	GRS 80
Central Meridian	115°W
Reference Latitude	0°N
1st Standard Parallel	60°N
2nd Standard Parallel	66°N
False Easting	0 m
False Northing	0 m

Attribute Field Names

Shape	Identifies shape type in ArcView. (Field is required by the software)
Community	Name of community

Reference

National Topographic Data Base (NTDB). Government of Canada, Natural Resources Canada, Centre for Topographic Information (Sherbrooke).

3.3.2. Corridor

File Description and Map Projection

File format	Shapefile (polygon)
File name (entity type)	Corridor
File description	Boundary of the Mackenzie Valley Transportation Corridor
File location	\Data\Shapefiles\Basedata\

Projection	Lambert Conformal Conic
Ellipsoid	GRS 80
Central Meridian	115°W
Reference Latitude	0°N
1st Standard Parallel	60°N
2nd Standard Parallel	66°N
False Easting	0 m
False Northing	0 m

Attribute Field Names

Shape	Identifies shape type in ArcView. (Field is required by the software)
Mapsheet	NTS map sheet number
Map_name	NTS map sheet name

Reference

National Topographic Data Base (NTDB). Government of Canada, Natural Resources Canada, Centre for Topographic Information (Sherbrooke)

4. ACKNOWLEDGMENTS

Christy Nieman and Krystal Thompson contributed to the quality control of this database. Reviewing comments by Dan Kerr are much appreciated.

5. REFERENCES

Aylsworth, J.M., Burgess, M.M., Desrochers, D.T., Duk-Rodkin, A., Roberston, T., and Traynor, J.A.
2000: Surficial geology, subsurface materials, and thaw sensitivity of sediments. *in* The Physical Environment of the Mackenzie Valley, Northwest Territories: A Base Line for the Assessment of Environmental Change, (ed.) L.D. Dyke and G.R. Brooks; Geological Survey of Canada, Bulletin 547, p.41-48.

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APPENDIX 1
Extended Legend for South.shp
Mapsheets 085D, 095A, 095B, 095G, 095H, 095I, 095J, 095N, and 095O

fO Organic (Fen)
Composed dominantly of moderately decomposed fen peat derived from sedge, tamarack and mosses, 2-3 m thick. Occurs in flat to very gently sloping areas, some with reticulate network of low (< 1 m) ridges. No organized drainage; water at the surface throughout summer months.

pO Organic (Bog)
Composed dominantly of moderately decomposed forest and/or undecomposed sphagnum peat derived from black spruce, *cladonia*, feathermosses, ericaceous and/or sphagnum vegetation, 1.5-7 m thick. Occurs in flat to gently sloping areas with scattered mounds (average relief 1 m, rarely to 6 m). Contains numerous steep-sided depressions (interconnected by seepage channels) and trenches.

pOk Organic (Bog) Thermokarst
Composed dominantly of moderately decomposed forest and/or undecomposed sphagnum peat derived from black spruce, *cladonia*, feathermoss, ericaceous and/or sphagnum vegetation, 1.5-7 m thick. Occurs in flat to gently sloping areas with mounds (average relief 1 m, rarely to 6 m). Contains numerous exposed peat scarps, depressions (interconnected by seepage channels) and trenches. Drainage is continually being modified.

Ap Alluvial Floodplain
Composed of gravel, sand and silt, 1-8 m thick; texture varies with the dominant material. Occurs in floodplains and low bordering terraces, floodplains within mountains commonly scarred by braided channels (with intermittent drainage through the channels), and floodplains within plain regions commonly with meander scars (no integrated drainage system).

At Alluvial Terrace
Terraces with relief intermediate between terraces associated with Ap and Gp. Level to slightly sloping surfaces, some interrupted by shallow channels and low terraces. Composed of gravel, sand and silt, 1-30 m thick; texture varies with the dominant material. Surface drainage without integrated drainage system.

Af Alluvial Fan
Composed mostly of gravel and some sand with gently to moderately sloping (1-8°) fans and coalescent fans, 3-25 m thick. Drainage commonly consists of one or more shifting stream. Downslope seepage occurs in poorly defined runs.

Cx Colluvial Complex
Colluvium derived for the entire range of surficial deposits, 1-6 m thick. Occurs in gently to steeply sloping irregular surfaces.

Er; Eh Aeolian Deposits
Composed mainly of fine to medium grained sand, 1-20 m thick. Er occurs in dune ridges, usually parallel to subparallel. Eh occurs in irregularly shaped dunes with no apparent pattern. Drainage is mainly subsurface seepage.

Lp; Lpv Glaciolacustrine Plain
Composed mainly of silt and fine sand, locally includes gravel and clay; Lp thickness of 1.5-50 m and Lpv thickness of 0.5-1.5 m. Occurs in flat to gently sloping areas. Drainage consists of surface seepage through organic-filled depressions and downslope seepage in shallow subparallel runs.

Lh Hummocky Glaciolacustrine Deposits
Composed mainly of silt and fine sand, 2-5 m thickness. Occurs in low hummocks up to 2 m, individual hummocks up to 5 m relief and slopes to 20°. Drainage is deranged.

Lpbx; Lpbxv; Lpbv Glaciolacustrine Beaches
Composed mainly of gravel with minor amounts of sand; locally may include silt. Lpbx thickness 1.5-2 m and Lpbxv thickness 0.5-1.5 m; occurs in parallel to subparallel beach ridges arranged in belts with slopes of up to 6°. Lpbv thickness 0.5-1.5 m; occurs in beach material without distinct ridges forming belts up to 6+ km wide. Drainage is mainly subsurface.

Gp; Gpv Glaciofluvial Plain
Composed of gravel, sand and silt; texture varies with the dominant material. Gp thickness 1-30+ m and Gpv thickness 0.5-1.5 m. Occurs in flat to gently sloping areas. Drainage is mainly subsurface.

Gpc Glaciofluvial Terrace
Composed of gravel, 1-30+ m thick. Occurs in flat to gently sloping areas. Drainage is mainly subsurface.

Gh Hummocky Glaciofluvial Deposits
Composed mainly of gravel and sand, 1-10 m thick. Occurs in hummocks with local relief of up to 10 m. Drainage is mainly subsurface.

Gr Ridged Glaciofluvial Deposits (includes eskers and esker complexes)
Composed mainly of gravel and sand, 1-30 m thick. Occurs in long, sinuous esker ridges, up to 30 m high. Drainage is mainly subsurface.

tMp; tMpc; tMv Moraine plain
Composed of moderately to strongly calcareous glacial till, typically with clay, silt and minor amounts of sand with 5% pebbles and boulders. Can contain lenses of gravel, sand, silt or clay within the till. Occurs in flat to uniformly sloping areas. Drainage of Mp and Mv is downslope seepage in subparallel runs; drainage of Mpc is downslope seepage in subparallel channels.

tMd Drumlins
Composed of moderately to strongly calcareous glacial till, can contain lenses of gravel or sand within the till; 2-30 m thick. Occurs in areas consisting largely of parallel drumlins. Trellis pattern or deranged drainage.

tMsd; tMds Flutings and Drumlins
Composed of moderately to strongly calcareous glacial till, can contain lenses of gravel or sand within the till; 2-30 m thick. Occurs in areas consisting largely of parallel drumlins and flutings. Trellis pattern or deranged drainage in drumlin areas to parallel seepage or streams in fluted areas.

tMs Flutings
Composed of moderately to strongly calcareous glacial till, can contain lenses of gravel or sand within the till; 2-30 m thick. Occurs in areas consisting largely of parallel flutings. Drainage is parallel seepage or streams.

Mr Crevasse Fillings or Ridged Moraine
Composed of moderately to strongly calcareous glacial till, gravel and sand; textures vary with the dominant material. Thickness of 1-10 m. Occurs in individual, parallel to subparallel, straight to sinuous ridges within a moraine plain with 0.5-5m relief and slopes of 5-30°. Integrated, weakly developed drainage is controlled by the ridge pattern.

Mh Hummocky moraine
Composed of moderately to strongly calcareous glacial till, gravel and sand; textures vary with the dominant material. Thickness of 1-20 m. Occurs in individual to coalescent hummocks at slopes of up to 20°. Drainage is deranged.

tMm Subdued Hummocky and Rolling Moraine
Composed of moderately to strongly calcareous glacial till, 5-10 m thick. Occurs in subdued hummocks and rolling terrain. Drainage is deranged.

S; Sx Debris Avalanche, Earthflow, Mudflow, Flowslide and Slump Debris
Material derived mainly from glaciofluvial silts and clays. rS and rSx material derived mainly from shale bedrock. Variable thickness. Debris avalanches commonly occur as thin narrow tongues, earthflows and mudflows as bulbous masses, and slump deposits as blocks.

Description of map units for bedrock and mountain terrain

L **M**
D **M**
L, D **M**
D, L **M**
L Sh **M**
Mountains developed in carbonate rocks, limestone and dolomite with minor amounts of shale. Occurs on mountains up to 1,500 m with sharp ridge crests and steep slopes. Ram Plateau area forms a level surface, dissected by deep canyons. Surficial deposits are: bare bedrock with discontinuous patches of limestone and dolomite rubble, bedrock colluvium with a matrix of fines and sand and/or reworked till on crests and steep slopes. Variable thickness of bedrock rubble and colluvium and/or reworked till at the bases of slopes; discontinuous over veneer of till on plateau areas.

S **M**
S, Sh **M**
S, Si, Sh **M**
Mountains developed on sandstone with shale, siltstone or limestone combinations. Occurs on mountains up to 1,600 m with rounding summits, long moderately steep slopes and extensive debris mantles. Surficial deposits are: bare bedrock with discontinuous patches of sandstone and limestone rubble, bedrock colluvium with a matrix of fines and sand and/or reworked till on crests and steep slopes. Variable thickness or bedrock rubble and colluvium and/or reworked till at the bases of slopes.

S, Sh **H**
High hills developed on sandstone and shale. Occurs on rounded summits and moderately steep slopes off the lower areas of the main mountain ranges. Surficial deposits are: discontinuous patches of clayey, silty, sandy colluvium, sandstone and limestone rubble, reworked till and/or bare rock on slopes and summit areas. Variable thickness of bedrock rubble and colluvium and/or reworked till at bases of slopes.

Sh, Si, S **H**
Sh **H**
Sh, S, Cg **H**
Sh, L, Si **H**
High hills developed on shale with limestone and siltstone members. Occurs on well-rounded summits with moderate slopes. Forming much of the lower areas between Franklin Mountains and Front Ranges of Mackenzie Mountains to the west. Surficial deposits are: discontinuous patches of clayey, silty, sandy colluvium, sandstone, and limestone rubble, reworked till and/or bare rock on slopes of summit areas. Variable thickness of bedrock rubble and colluvium and/or reworked till at the bases of slopes.

S, Si, Sh **L**
Low hills developed on sandstone and shale with a small area of limestone. Occurs on moderate to gentle slopes and rounded summits containing little or no glacial drift. Surficial deposits are: veneer of clayey, silty, sandy colluvium; some with till and/or rubble.

Unified Soil Classification Units

GW
Well-graded gravels, gravel-sand mixtures, little or no fines

GP
Poorly graded gravels, gravel-sand mixtures, little or no fines

GM d and GM u
Silty gravels, gravel-sand-silt mixtures

GC
Clayey gravels, gravel-sand-silt mixtures

SW
Will-graded sands, gravelly sands, little or no fines

SP
Poorly graded sands, gravelly sands, little or no fines

SM d and SM u
Silty sands, sand-silt mixtures

SC
Clayey sands, sand-clay mixtures

ML
Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity

CL
Inorganic clays of low or medium plasticity, gravelly clays, sandy clays, silty clays, lean clays

OL
Organic silts and organic silty clays of low plasticity

MH
Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts

CH
Inorganic clays of medium to high plasticity, fat clays

OH
Organic clays of medium to high plasticity, organic silts

APPENDIX 2
Extended Legend for Middle_east.shp
Mapsheets O96C, 096D, 096E, 096F, 106I, and 106P

fOv Organic Veneer
Peat dominant – typically woody sedge peat. Occurs in very gently sloping (0-3°) shallow channels, runs and depressions. Relief to 1 m.

fO Organic Fenland
Peat dominant – typically woody sedge peat. Occurs in flat to very gently to gently sloping land, in part with reticulate network of low ridges. Relief to 1 m.

pO Organic Peatland
Peat dominant – typically sedge and woody sedge peat overlain by sphagnum peat. Occurs in flat to very gently sloping areas, typically with numerous shallow steep-sided (2-3 m) depressions occupied by lakes, ponds and bogs.

sAp; s,gAp; $/gAp Alluvial Flood Plain – high energy streams
Materials consist of sand and gravel, in part with silt veneer. Flood plain and low bordering terraces scarred by braided channels.

s,$Ap; $Ap Alluvial Flood Plain – low energy streams
Materials consist of sand and gravel, in part with silt veneer. Flood plain and low bordering terraces scarred by braided channels.

Apk Thermokarst Alluvial Flood Plain
Materials consist of fine-grained sand and silt. Level floodplain, in part with meander scars and with numerous channels and thermokarst ponds.

gAt; sgAt; $/gAt Alluvial Terraces – high energy streams
Materials consist of sand and gravel, in part with silt veneer. Level to gently sloping terrace, in part with shallow channels and steep scarps.

s,$At Alluvial Terraces – low energy streams
Materials consist of fine-grained sand, silt, locally with veneer of eolian silt of sand. Level to gently sloping terrace, in part with shallow channels and step scarps.

Af Alluvial Fans and Fan Aprons
Materials are highly variable and consist of silt, sand, gravel, and peat. Occur in gently to moderately sloping areas.

Cx Colluvial Complex
Colluvium derived from entire range of surficial deposits plus bedrock detritus. Occurs on steeply sloping valley walls and scarps.

Cv Colluvial Veneer
Materials consist of rock detritus, with a minor component of glacially transported material. Veneer conforms to bedrock topography.

E Eolian Deposits
Materials consist of sand, mainly fine to medium grained.

Lp Glaciolacustrine Plain
Materials consist of rock detritus, with a minor component of glacially transported material. Veneer conforms to bedrock topography.

Lpk Glaciolacustrine Thermokarst Plain
Materials consist of glaciolacustrine sand and silt commonly overlying glaciolacustrine silt and clay, with a discontinuous organic cover. Occurs in flat to gently sloping land, with numerous thermokarst lakes and ponds.

Lb Glaciolacustrine Beach
Materials consist of sand and gravel. Ridges and terraces present.

GLp Glaciofluvial-Lacustrine Plain
Materials consist of glaciolacustrine silt and clay overlain by glaciofluvial sand with minor silt, rare fine gravel. Discontinuous organic cover. Occurs in flat to gently sloping areas.

GLpk Glaciofluvial-Lacustrine Thermokarst Plain
Materials consist of glaciolacustrine silt and clay overlain by glaciofluvial sand with minor silt, rare fine gravel. Discontinuous organic cover. Occurs in flat to gently sloping areas with numerous shallow thermokarst lakes and ponds.

Gc Glaciofluvial Plain, Channelled
Materials consist of sand, gravel, with silt and peat in channels. Flat to gently sloping land interrupted by shallow channels and low scarps.

Gp Glaciofluvial Plain
Materials consist of sand and gravel, locally with veneer of eolian silt or sand. Peat occurs in channels. Flat to gently sloping.

Gt Glaciofluvial Terrace
Materials consist of sand and gravel, locally with veneer of eolian silt or sand. Peat occurs in channels. Flat to gently sloping terrain, interrupted by shallow channels and low scarps.

Gh; Gr Hummocky, Ridged Glaciofluvial Deposits
Materials consist of gravel and sand.

Mp; Mv Moraine Plain
Materials consist of glacial till, typically clay and silt, minor sand and gravel. Occurs in flat to gently sloping areas. Mv indicates a shallow (0-3 m) layer.

Md Drumlin Moraine Plain
Materials consist of glacial till. Terrain varies from moraine plain with individual drumlins, to fluted moraine plain.

Mm Subdued Hummocky Moraine
Materials consist of glacial till with minor gravel. Broad hummocks 10 to 30 m high and 100 – 500 m across.

Mh Hummocky Moraine
Materials consist of glacial till with minor gravel. Individual to coalescent hummocks 15 to 50+ m high.

Mr Ridged Moraine
Materials consist of glacial till with minor gravel. Individual and compound straight to sinuous ridges 15 to 50+ m high.

Ug Upland, Glaciated
Materials consist of glacial till, minor glaciofluvial sand and gravel, glaciolacustrine silt and clay, peat. Rolling bedrock controlled topography.

Pg Piedmont, Glaciated
Materials consist of mainly glacial till. Widely distributed glaciolacustrine silt and clay in valleys. Broadly rolling piedmont slopes on east flank of Richardson Mountains.

R Bedrock
Tertiary conglomerates, sandstones, shales. Cretaceous sandstones, shales. Paleozoic sandstones, carbonates, shales, evaporites, quartzites. Occur mainly on prominent ridges, carps and hills developed on resistant sandstones, quartzites and carbonates.

APPENDIX 3
Extended Legend for Middle_west.shp and 107b.shp
Mapsheets 106G, 106J, 106K, 106L, 106O, 107B

Alluvial deposits: sand, silt, clay, minor gravel and minor organic sediments in association with modern drainage.

Af Alluvial Fan
Silt, sand, and gravel, locally with discontinuous layers of woody peat, deposit is generally coarser textured in upper Mackenzie area than in central and lower Mackenzie area, occurring as individual fans or fan aprons, 5 m to over 30 m thick.

Ap Alluvial Plain
Coarse sand and gravel with minor silt, fine sand and clayey silt; commonly organic; 2 m to over 5 m thick; occurring as channel and overbank floodplain sediments, includes deltas, and many incorporate small areas of glaciofluvial sediment. In the Mackenzie Delta, unit consists of silt, fine sand, and clayey silt, underlain by coarse sand and gravel in some areas, commonly organic, 10-30 m thick; occurring as flat surface marked by numerous distributaries, islands, lakes and marshes.

At Alluvial Terrace
Sand and silt, in many places underlain by gravel, occurring as terraces, 2-5 m thick.

Colluvial Deposits: diamicton and rubble derived from bedrock and surficial materials by a variety of colluvial and sheetwash processes.

C Colluvial Deposits
Diamicton or rubble, occurring as blanket or continuous to discontinuous veneer draping underlying bedrock or surficial sediments, generally < 5 m thick; in mountainous regions underlying material is commonly bedrock, unit includes small landslides and small areas of alluvial or glaciofluvial fans and deltas.

Cz Colluvial complex
Landslide deposits: rubble and/or diamicton occurring as stepped of fan shaped deposit; commonly occurring as rotational slumps in bedrock or in glaciolacustrine sediments overlain by sand and gravel and as retrogressive thaw flow slides in glaciolacustrine silt and clay or other fine grained sediment; generally greater than 5 m thick.

Eolian deposits: sand with minor silt, sediment derived from glaciofluvial or sandy lacustrine deposits.

E Eolian ridges
Sand with minor silt, 1-4 m thick, occurring as parabolic or blowout dunes on sandy glaciofluvial, lacustrine or alluvial deposits, less commonly occurs as sand blanket or veneer.

Glaciofluvial deposits: sand and gavel locally with a veneer of eolian silt or sand; deposited as proglacial or ice contact sediments by glacial meltwater.

Gp Glaciofluvial outwash plains and terraces
Sand and gravel with silt and peat is some channels, occurring as flat to gently sloping plain or erosional terrace, locally may be rolling to hummocky surface modified by thermokarst, 2-30 m thick.

Gx Glaciofluvial complex
Ice contact deposits of gravel and sand with minor silt or diamicton, occurring as hummocks or ridges or as complexes of hummocks, ridges, and/or kettled or thermokarst modified glaciofluvial plains and terraces; 2-30 m thick, local relief up to 25 m.

Glacial lacustrine and lacustrine deposits: silt, sand and clay, in many places overlain by discontinuous veneer of organic deposits and locally overlain by sand; sediments laid down in glacial lakes which temporarily occupied the Mackenzie and other valleys at the end of the ice age or, in the far north of the map, in thermokarst lakes formed and infilled during the Holocene.

Lpc Lacustrine Plain – coarse grained sediment
Sand, local gravel, commonly underlain by finer grained lacustrine sediments; occurring as raised deltas, flat to gently sloping sheet sands, spits, bars and beaches, includes complexes where fine grained lacustrine deposits are overlain by up to 3 m of glaciofluvial sand; 1.5-15m or more thick; locally overlain by peatlands.

Lpf Lacustrine Plain – fine grained sediment
Silt, clay and minor sand, occurring as flat to gently sloping plain, 1.5-15 m or more thick; locally may occur as veneer <2 m thick, or as moderately sloping plain or broad hummocks or low hills. 2-25 m thick; locally may contain low beach ridges of sand and gravel; locally overlain by peatlands.

Lv Lacustrine Complex
Silt and clay with minor sand in many places overlain by a discontinuous veneer of organic deposits and locally overlain by sand; veneer of sediments occurring as a flat to gently sloping plain, 0-3 m thick.

Glacial deposits: till (nonsorted silt, sand, and clay with some coarser clasts); deposited by glacier ice and occurring as a variety or landforms; locally includes minor scattered glaciofluvial gravel and sand deposits.

Mb Moraine, Blanket
Till, non-sorted silt, sand and clay with some coarser clasts, occurring as gently to moderately sloping plain controlled by bedrock, 2-6 m thick.

Md Moraine, Drumlinoid Plain
Drumlinoid plain: till plain with individual drumlins or extensively fluted, 2-30 m thick.

Mh Moraine, Hummocky
Generally coarse till (20-50% pebble size) throughout most of the map are and clayey till in the north, up to 60 m thick, consisting of individual or coalescent hummocks (5-50 m relief), and/or

individual to compound, straight to sinuous ridges (5-60 m relief), and/or till with 5-20% pebble size in broad hummocks or low hills (10-20 m relief).

Mp Moraine Plain
Tills occurring as flat to gently sloping plain, in places moderately sloping, 2-20 m thick.

Mv Moraine Veneer
Till occurring as veneer overlying bedrock topography, <2 m thick, unit includes minor colluvial deposits, north of latitude 69° moraine veneer commonly overlies sandy or silty clay marine deltaic sequences and in places proglacial outwash.

R Rocks
Primarily prominent ridges, escarpments and hills. Shale, sandstone, and limestone generally occurring as prominent ridges, escarpments and hills; surfaces generally weathered or obscured by colluvium.

fpO Organic (Fen)
Fen dominant peatland: woody sedge peat, 2-4 m thick, occurring as flat to very gently inclined plains, commonly featureless, may contain reticulate network of low (50 cm) ridges.

pfO Organic (Bog)
Bog dominant peatland: sphagnum peat generally underlain by sedge and woody sedge peat, commonly 1.5-3 m thick, may be up to 7 m thick in south; occurring as flat or very gently inclined plains, usually raised about 1 m above surrounding fens, or as peat filling slight depressions in the landscape, typically with numerous shallow steep-sided thermokarst depressions.