THESE TERMS GOVERN YOUR USE OF THIS DOCUMENT

Your use of this Ontario Geological Survey document (the "Content") is governed by the terms set out on this page ("Terms of Use"). By downloading this Content, you (the "User") have accepted, and have agreed to be bound by, the Terms of Use.

Content: This Content is offered by the Province of Ontario's *Ministry of Northern Development and Mines* (MNDM) as a public service, on an "as-is" basis. Recommendations and statements of opinion expressed in the Content are those of the author or authors and are not to be construed as statement of government policy. You are solely responsible for your use of the Content. You should not rely on the Content for legal advice nor as authoritative in your particular circumstances. Users should verify the accuracy and applicability of any Content before acting on it. MNDM does not guarantee, or make any warranty express or implied, that the Content is current, accurate, complete or reliable. MNDM is not responsible for any damage however caused, which results, directly or indirectly, from your use of the Content. MNDM assumes no legal liability or responsibility for the Content whatsoever.

Links to Other Web Sites: This Content may contain links, to Web sites that are not operated by MNDM. Linked Web sites may not be available in French. MNDM neither endorses nor assumes any responsibility for the safety, accuracy or availability of linked Web sites or the information contained on them. The linked Web sites, their operation and content are the responsibility of the person or entity for which they were created or maintained (the "Owner"). Both your use of a linked Web site, and your right to use or reproduce information or materials from a linked Web site, are subject to the terms of use governing that particular Web site. Any comments or inquiries regarding a linked Web site must be directed to its Owner.

Copyright: Canadian and international intellectual property laws protect the Content. Unless otherwise indicated, copyright is held by the Queen's Printer for Ontario.

It is recommended that reference to the Content be made in the following form:

Barnett, P.J., Yeung, K.H. and McCallum, J.D. 2016. Surficial geology of the Black Duck River area southeast, northern Ontario; Ontario Geological Survey, Preliminary Ma p P.3627, scale 1:100 000

Use and Reproduction of Content: The Content may be used and reproduced only in accordance with applicable intellectual property laws. *Non-commercial* use of unsubstantial excerpts of the Content is permitted provided that appropriate credit is given and Crown copyright is acknowledged. Any substantial reproduction of the Content or any *commercial* use of all or part of the Content is prohibited without the prior written permission of MNDM. Substantial reproduction includes the reproduction of any illustration or figure, such as, but not limited to, graphs, charts and maps. Commercial use includes commercial distribution of the Content, the reproduction of multiple copies of the Content for any purpose whether or not commercial, use of the Content in commercial publications, and the creation of value-added products using the Content.

Contact:

FOR FURTHER INFORMATION ON	PLEASE CONTACT:	BY TELEPHONE:	BY E-MAIL:
The Reproduction of the EIP or Content	MNDM Publication Services	Local: (705) 670-5691 Toll-Free: 1-888-415-9845, ext. 5691 (inside Canada, United States)	Pubsales.ndm@ontario.ca
The Purchase of MNDM Publications	MNDM Publication Sales	Local: (705) 670-5691 Toll-Free: 1-888-415-9845, ext. 5691 (inside Canada, United States)	Pubsales.ndm@ontario.ca
Crown Copyright	Queen's Printer	Local: (416) 326-2678 Toll-Free: 1-800-668-9938 (inside Canada, United States)	Copyright@ontario.ca

Marginal Notes

In 2008, the Ontario government announced plans to permanently protect half of the Far North region of Ontario and launched a planning process to support this goal (Far North Information Knowledge Management Program). During the initial stages of planning, the need for primary landscape data became apparent. A terrain mapping project to remotely predict surficial materials was initiated by the Ontario Geological Survey in response to this information need.

SPOT imagery (4 colour bands and the panchromatic band), a digital elevation model and its derivatives and the Ontario Hydro Network vector drainage shape files (Ontario Ministry of Natural Resources 2010) are the primary data sources for this remote predictive mapping exercise. A multiresolution segmentation algorithm, using different image layer weights, scale parameters and homogeneity criterion, within an object-based image analysis software is used to achieve meaningful objects representing various surficial material types. Objects are then classified based on digital signature, internal variability of signature and proximity to certain vector layers and certain adjacent material types.

Limited helicopter-supported field work combined with the examination of archival information (Riley and Boissonneau (unpublished field notes and photographs); Geological Survey of Canada, Operation Winisk unpublished field notes; Skinner 1973; Sanford, Norris and Bostock 1968; Sanford and Norris 1975; and Thorleifson, Wyatt and Warman 1993, and their unpublished field notes) provided the ground control on the classification of objects. In addition, information from the various other Far North Information Knowledge Management Program projects, such as base data and land cover information (Ontario Ministry of Natural Resources, in progress), has been used in the interpretation and classification of the surficial materials.

The maps show only the surface material distribution. For better definition of wetland types please refer to the Ontario Ministry of Natural Resources Far North Land Cover 2005–2009 digital series of maps. Older deposits that occur along many of the deeply incised river valleys are not depicted. However, the reader is encouraged to review books by Skinner (1973) and Thorleifson, Wyatt and Warman (1993) for further information and details on the older sediments exposed along rivers within the Hudson Bay Lowland.

This project is funded by the Far North Branch, Ontario Ministry of Natural Resources, and the Ontario Geological Survey, Ontario Ministry of Northern Development and Mines. Interaction with the First Nation community members greatly enhanced the map products of the Far North Information Knowledge Management Program Terrain Mapping Project.

REFERENCES

Geological Survey of Canada. Operation Winisk; unpublished field notes, Geological Survey of Canada, Ottawa, Canada.

Ontario Ministry of Natural Resources 2010. Ontario Hydrographic Network; Ontario Ministry of Natural Resources, Land Information Ontario, OHN digital layer files, Peterborough, Ontario.

Ontario Ministry of Natural Resources, in progress. Far North Land Cover 2005–2009 (digital map series); Ontario Ministry of Natural Resources, Land Information Ontario, Peterborough, Ontario.

Riley, J. and Boissonneau, A. Unpublished field notes and photographs; Ontario Ministry of Natural Resources, Peterborough, Ontario.

Sanford, B.V. and Norris, A.W. 1975. Devonian stratigraphy of the Hudson Bay Platform; Geological Survey of Canada, Memoir 379, 124p.

Sanford, B.V., Norris, A.W. and Bostock, H.H. 1968. Geology of the Hudson Bay Lowlands (Operation Winisk); Geological Survey of Canada, Paper 67-60, p.1-45.

Skinner, R.G. 1973. Quaternary stratigraphy of the Moose River Basin, Ontario; Geological Survey of Canada, Bulletin 225, 77p.

Thorleifson, L.H., Wyatt, P.H. and Warman, T.A. 1993. Quaternary stratigraphy of the Severn and Winisk drainage basins, northern Ontario; Geological Survey of Canada, Bulletin 442, 59p.

LEGEND[a]

PHANEROZOIC

CENOZOIC

QUATERNARY

20	**Marine Mud-Flat Deposits:** Sand, silt and clay; deposited in mud flats and offshore bars within the tidal zone.
19	**Marine Salt-Marsh Deposits:** Silt and clay with organic matter, minor sand; deposited in salt marshes along present-day coast.
18	**Organic Deposits:** Peat, muck and/or marl; deposited in fen wetlands.[b]
17	**Organic Deposits:** Peat, muck and/or marl; deposited in bog wetlands.[b]
16	**Fluvial Deposits (recent):** Stratified sand and gravel; may include silt, minor clay. Deposited in bars and channels of present-day rivers and creeks.
15	**Fluvial Deposits (abandoned):** Stratified sand and gravel; may include silt, minor clay. Deposited in bars and channels along abandoned terraces of rivers and creeks.
14	**Marine Deltaic Deposits:** Stratified sand and gravel; silt, minor clay. Deposited at the mouths of rivers and creeks entering a postglacial sea.
13	**Marine Beach and Nearshore Deposits:** Stratified sand and gravel; minor silt. Deposited primarily in the shore zone and nearshore zone of a postglacial sea.
12	**Marine Basin Deposits:** Massive to stratified silt and clay; minor sand. Deposited in basinal areas of a postglacial sea.
11	**Glaciolacustrine Deltaic Deposits:** Stratified sand and gravel; may include minor silt and clay. Deposited at the mouths of rivers and creeks entering a proglacial lake.
10	**Glaciolacustrine Beach and Nearshore Deposits:** Stratified sand and gravel; minor silt. Deposited primarily in the shore zone and nearshore zone of a proglacial lake.
9	**Glaciolacustrine Basin Deposits:** Stratified silt and clay; minor sand. Deposited in basinal areas of a proglacial lake.
8	**Glaciofluvial Outwash Deposits:** Stratified sand and gravel; including minor silt, clay. Deposited in bars and channels in rivers flowing from a glacier.
7	**Glaciofluvial Ice-Contact Deposits:** Stratified sand and gravel; including minor silt, clay, till and flowtill. Deposited in eskers, kames, deltas and subaqueous fans and in end and recessional moraines along a glacier margin.
6	**Till:** Massive to bedded diamicton; clayey silt to clay matrix, clast content low to moderate, moderate to high matrix carbonate content, may contain discontinuous layers or lenses of stratified gravel, sand, silt and/or clay; includes flowtills. Deposited at the base or along the margins of a glacier.
5	**Till:** Massive to bedded diamicton; sandy silt to silt matrix, clast content moderate to high, low to high matrix carbonate content, rare discontinuous layers or lenses of stratified gravel, sand, silt and/or clay, or flowtills. Deposited at the base or along the margins of a glacier.
4	**Till:** Massive to bedded diamicton; silty sand to sand matrix, clast content moderate to high, low to moderate matrix carbonate content, rare discontinuous layers or lenses of stratified gravel, sand, silt and/or clay, or flowtills. Deposited at the base or along the margins of a glacier.
3	**Thin Sediment over Bedrock:** Thin, near-continuous cover of Quaternary sediments overlying undifferentiated bedrock. Quaternary sediments are commonly less than 1 m thick; however, areas of outcrop indicated on the map may contain small areas where the cover exceeds 1 m in thickness, but are too small to delineate at this map scale.

PALEOZOIC, MESOZOIC AND CENOZOIC (TERTIARY)

2	**Bedrock:** Undifferentiated bedrock with a thin, discontinuous cover of Quaternary sediments. Quaternary sediments rarely exceed 0.5 m in thickness; however, areas of outcrop indicated on the map may contain small areas where the cover exceeds 1 m in thickness, but are too small to delineate at this map scale.

PRECAMBRIAN

1	**Bedrock:** Undifferentiated bedrock with a thin, discontinuous cover of Quaternary sediments. Quaternary sediments rarely exceed 0.5 m in thickness; however, areas of outcrop indicated on the map may contain small areas where the cover exceeds 1 m in thickness, but are too small to delineate at this map scale.

[a] The map legend applies to Preliminary Maps P.3625 to P.3758, and P.3767. Deposits on this sheet are mapped primarily where they reach 1 m or more in thickness. Thinner deposits are not generally shown. All legend units or deposit types may not be present on this map.

[b] Refer to Ontario Ministry of Natural Resources Far North Land Cover 2005–2009 series of digital maps for better definition of wetland types and distribution.

SOURCES OF INFORMATION

The digital base map is derived from the Land Information Ontario Data Warehouse, Land Information Ontario, Ministry of Natural Resources and Forestry, scale 1:50 000, with modifications by staff of the Ministry of Northern Development and Mines. The digital base data is current to January 2014. The map co-ordinates are in UTM zone 16, North American Datum 1983 (NAD83).

Magnetic declination at the centre of the map area was approximately 7°48.54'W in 2016. Mean annual change is 3.0'E.

Barnett, P.J., Webb, J.L. and Hill, J.L. 2009. Flow indicator map of the Far North of Ontario; Ontario Geological Survey, Preliminary Map P.3610, scale 1:1 000 000.

Norris, A.W., Sanford, B.V. and Bostock, H.H. 1967. Geology, Hudson Bay Lowlands, Manitoba, Ontario, Quebec and District of Keewatin, compiled; Geological Survey of Canada, Preliminary Map 17-1967. Accompanies Geological Survey of Canada, Paper 67-60.

Ontario Centre for Remote Sensing. Surficial geology, Black Duck River area, Ontario; unpublished map, Ontario Ministry of Natural Resources, OCRS-54A, scale 1:250 000.

Ontario Ministry of Natural Resources 2010. Ontario radar digital surface model; Ontario Ministry of Natural Resources, Land Information Ontario, Peterborough, Ontario.

Pala, S., Barnett, P.J. and Babuin, D. 1991. Quaternary geology of Ontario, northern sheet; Ontario Geological Survey, Map 2553, scale 1:1 000 000.

Sanford, B.V. and Norris, A.W. 1975. Devonian stratigraphy of the Hudson Bay Platform; Geological Survey of Canada, Memoir 379, 124p.

Ontario

Ontario Geological Survey

MAP P.3627

SURFICIAL GEOLOGY

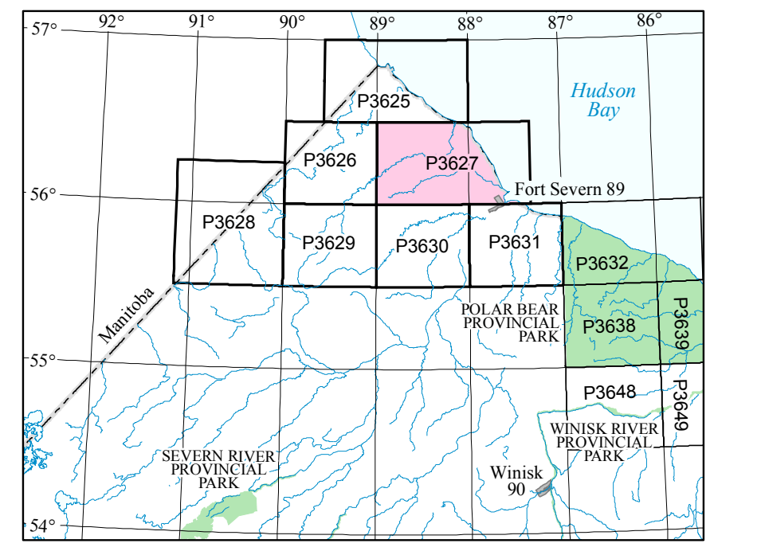
BLACK DUCK RIVER AREA SOUTHEAST, NORTHERN ONTARIO

Scale 1:100 000

2000 m 0 2 4 km

NTS References: 44 D/3, 4, 5, 6; 54 A/1, 2, 7, 8

This map is published with the permission of the Director, Ontario Geological Survey.



Location Map

1 cm equals 50 km

SYMBOLS[a]

- Bedrock outcrop[b]
- Lineament observed on remotely sensed imagery
- Brow of large landslide or failure scar
- Base of terraced escarpment (abandoned glaciolacustrine or marine shorebluff)
- Base of terraced escarpment (margin of abandoned or modern, fluvial or glaciofluvial terrace)
- Trend or crest of abandoned or modern beach bar or spit
- Base of large ice-contact slope
- Trend of large moraine or moraine crest
- Trend of minor moraine or moraine crest; includes De Geer (or washboard) moraines
- Area of hummocky moraine
- Area of palimpsest moraine
- Area of ribbed landforms; includes Rögen (or ribbed) moraine, scabland-type erosional features and/or megaripples
- Trend of esker or esker crest
- Glacial erosion features carved into the bedrock surface (includes striations, grooves, etc.); direction of ice movement known, unknown[b]
- Streamline form with positive relief; includes drumlins, drumlinoid ridges and crag-and-tail features
- Streamline form with negative relief; includes flutes
- Large iceberg keel mark
- Large sand dune (aeolian)
- Area of extensive palsas
- Area of suspected karst features
- Indian Reserve, park boundary, township
- Utility
- Road, railroad

[a] The symbols list applies to Preliminary Maps P.3625 to P.3758, and P.3767. All symbols may not be present on this map.

[b] As presented on published and unpublished maps.

CREDITS

Geology by P.J. Barnett, K.H. Yeung and J.D. McCallum, 2011.

Additional symbols digitized by D. Partington and J. Bonin.

Preparation of GIS product by K.H. Yeung and J.D. McCallum.

Cartographic production by A. Evers and R. Corcoran.

Every possible effort has been made to ensure the accuracy of the information presented on this map; however, the Ministry of Northern Development and Mines does not assume liability for errors that may occur. Users should verify critical information.

Issued 2016.

Information from this publication may be quoted if credit is given. It is recommended that reference to this map be made in the following form:

Barnett, P.J., Yeung, K.H. and McCallum, J.D. 2016. Surficial geology of the Black Duck River area southeast, northern Ontario; Ontario Geological Survey, Preliminary Map P.3627, scale 1:100 000.

Users of OGS products are encouraged to contact those Aboriginal communities whose traditional territories may be located in the mineral exploration area to discuss their project.