## 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:

Ontario Geological Survey 1991. Bedrock geology of Ontario, northern sheet; Ontario Geological Survey, Map 2541, scale 1:1 000 000.

**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.

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@gov.on.ca

## Contact:



AESO	PROTEROZOIC (0.9 to 1.6 Ga)		
40	CENTRAL GNEISS BELT Felsic igneous rocks: tonalite,		
40	granodiorite, monzonite, granite, syenite; derived gneisses		
39	Anorthosite and alkalic igneous rocks: anorthosite, anorthositic gabbro, gabbro		
	and related gneisses, nepheline syenite, alkalic syenite		
38	Migmatitic rocks and gneisses of undetermined protolith: commonly		
	layered biotite gneisses and migmatites; locally includes quartzofeldspathic		
	gneisses, orthogneisses, paragneisses Mafic rocks: amphibolite, gabbro, diorite,		
37	mafic gneisses		
36	quartzofeldspathic gneisses, pelitic to		
	gneisses, minor quartzite, minor marble and marble breccia		
SC	OUTHERN <sup></sup> <sup>▶</sup> AND SUPERIOR PROVINCES		
EARLY	Y PALEOZOIC TO ROTEROZOIC (0.45 to 0.9 Ga)		
05	Carbonatite-alkalic intrusive suite		
35	(450 to 600 Ma): carbonatite, nepheline svenite, alkalic svenite, ijolite, fenite;		
	associated mafic and ultramafic intrusions		
	35a Intrusions of uncertain age		
34	34a Grenville swarm (~575 Ma): diabase		
	dikes		
	diabase dikes		
	34c Gabbro, diorite, ultramatic rocks, granophyre		
OTE	ROZOIC		
MESO	PROTEROZOIC (0.9 to 1.6 Ga)		
	UPPER KEWEENAWAN SUPERGROUP (<1086 Ma)		
33	Jacobsville Gp.; Oronto Gp.: sandstone, shale, conglomerate		
	INTRUSIVE ROCKS		
32	Carbonatite-alkalic intrusive suite (1.0 to 1.2 Ga): carbonatite, nepheline		
	syenite, alkalić syenite, ijolite, fenite; associated matic and ultramatic rocks		
21	Mafic and related intrusive rocks		
31	(Keweenawan age) <sup>1</sup>		
	diabase sills		
	31b Pigeon River and Pukaskwa swarms: diabase dikes		
	31c Ultramafic, gabbroic and granophyric intrusions		
	31d Felsic to intermediate intrusive rocks		
	dikes		
30	Mafic intrusive rocks <sup>1</sup>		
	diabase dikes		
	dikes		
	MIDDLE AND LOWER KEWEENAWAN SUPERGROUP (1086 to 1107 Ma)		
29	Osler Gp.; Mamainse Point Fm., Michipicoten Island Fm.		
	29a Basalt and associated conglomerate		
	29b Rhyolite, quartz feldspar porphyry; associated conglomerate and arkose		
28	Sibley Gp.: conglomerate, sandstone,		
MESC			
(0.9 to	2.5 Ga)		
27	Felsic intrusive rocks		
	guartz feldspar porphyry; minor		
	related volcanic rocks / (1.4 to 1.5 Ga)		

27b Killarney monzogranite and granitic

27c Intermediate to felsic volcanic rocks k

rocks *k* (1.7 and 1.4 Ga)

(1.8 to 1.9 Ga)

PALEOPROTEROZOIC (1.6 to 2.5 Ga)				
26	Sudbury Igneous Complex (1850 Ma): norite, gabbro, granophyre			
25	Whitewater Gp. 1: fragmental rocks, mudstone, wacke			
24	Carbonatite–alkalic intrusive suite (ca. 1.9 Ga): carbonatite, nepheline syenite, alkalic syenite, ijolite, fenite; associated mafic and ultramafic rocks			
23	Mafic intrusive rocks <sup>i</sup> 23a Molson swarm (1884 Ma) diabase			
	dikes; and <i>Sutton Inlier:</i> diabase sills 23b <i>Wabigoon swarm:</i> diabase dikes 23c <i>North Channel swarm:</i> diabase dikes			
22	Sedimentary rocks			
	formation, limestone, minor volcanic rocks 22b <i>Sutton Inlier:</i> dolostone, chert breccias, argillite, wacke,			
	conglomerate, iron formation			
21	21a Preissac swarm: diabase dikes			
	21b Marathon swarm: diabase dikes 21c Kenora–Fort Frances swarm: diabase dikes			
	21d Nipissing sills (2219 Ma): diabase			
	21e Mafic dikes and plutons of uncertain age			
20	Felsic intrusive rocks (Murray Granite 2388 Ma, Creighton Granite 2333 Ma): granite			
	HURONIAN SUPERGROUP (2.2 Ga to 2450 Ma)			
19	<b>Cobalt Gp.</b> <sup><i>n</i></sup> : conglomerate, wacke, arkose, quartz arenite, argillite			
18	Quirke Lake Gp.; Hough Lake Gp.; Elliot Lake Gp.			
	<ul> <li>18a Conglomerate, wacke, arkose, quartz arenite, argillite, limestone, dolostone</li> <li>18b Volcanic rocks of the Elliot Lake Gp.</li> </ul>			
	INTRUSIVE ROCKS			
17	Mafic and ultramafic intrusive rocks			
	<i>(2454 Ma)<sup>1</sup>:</i> diabase dikes 17b Gabbro, anorthosite			
	SUPERIOR PROVINCE			
ARCHE	AN RCHEAN (2.5 to 2.9 Ga)			
NEUA	INTRUSIVE ROCKS			
16	Diorite-nepheline syenite suite <sup>go</sup> : pyroxenite, diorite, monzonite, syenite, nepheline syenite (saturated to undersaturated suite)			
NEO- ' (2.5 to :	TO MESOARCHEAN 3.4 Ga) <sup>egop</sup>			
the second second	INTRUSIVE ROCKS			
15	massive granouonite to granite. massive to foliated granodiorite to granite 15a. Potassium feldspar megacrystic units			
14	Diorite-monzonite-granodiorite suite: diorite, tonalite, monzonite, granodiorite, syenite and hypabyssal equivalents (saturated to oversaturated suite)			
13	Muscovite-bearing granitic rocks: muscovite-biotite and cordierite-biotite granite, granodiorite-tonalite			
12	Foliated tonalite suite: tonalite to granodiorite—foliated to massive			
11	Gneissic tonalite suite: tonalite to granodiorite—foliated to gneissic—with minor supracrustal inclusions			

Mafic and ultramafic rocks q: gabbro, anorthosite, ultramafic rocks

NEO-ARCHEAN (2.5 to 2.9 Ga)					
	SUPRACRUSTAL ROCKS				
0	Coarse clastic metasedimentary				
5	rocks <sup>r</sup> : mainly coarse clastic				
	alkalic, mafic to felsic metavolcanic flows,				
	tuffs and breccias				
NEO-7	TO MESOARCHEAN (2.5 to 3.4 Ga)				
	SUPRACRUSTAL ROCKS				
8	Migmatized supracrustal rocks <sup>eg</sup> :				
	metavolcanic rocks, minor metasedimentary rocks, mafic gneisses of				
	uncertain protolith, granitic gneisses				
- <b>,</b>	Metasedimentary rocks eg: wacke,				
1	arkose, argillite, slate, marble, chert, iron				
	Tormation, minor metavoicanic rocks				
	7a Condomerate and arenite				
6	rocks <sup>gt</sup> : rhyolitic, rhyodacitic, dacitic and				
	andesitic flows, tuffs and breccias, chert,				
	iron formation, minor metasedimentary and				
	Intrusive rocks, related migmattes				
5	rocks <sup>gt</sup> : basaltic and andesitic flows.				
	tuffs and breccias, chert, iron formation,				
	minor metasedimentary and intrusive				
	rocks, related migmatites				
	with minor rhyolites <sup>u</sup>				
	Mafic to ultramafic metavolcanic				
4	rocks <sup>gt</sup> : mafic metavolcanic rocks with				
	minor komatiite, minor metasedimentary				
MECO	A DOLLEAN (2.0.4-2.4.Ca)V				
MESO.	AKCHEAN (2.9 to 3.4 Ga)				
	SUPRACRUSTAL ROCKS				
3	metasedimentary rocks <sup>t</sup> : mafic				
Card Harris Harrison and San Anna A	metavolcanic rocks, minor iron formation				
0	Felsic to intermediate metavolcanic				
- 2	rocks <sup>t</sup> : rhyolitic, rhyodacitic, dacitic and				
	andesitic flows, tuffs and preccias				
1	Metasedimentary rocks and matic to				
	coarse clastic metasedimentary rocks,				
	marble, quartz arenite, iron formation,				
	komatilite, matic metavolcanic rocks, and minor felsic metavolcanic rocks				
	minor felsic metavolcanic rocks				

<sup>a</sup> The letter "G" preceding a map unit number indicates lithologic information interpreted from geophysical data. <sup>b</sup> Phanerozoic stratigraphic nomenclature varies in the level of detail to match the variable level of detail displayed on the map face.

<sup>c</sup> Unassigned. <sup>d</sup> Subdivisions of Precambrian geologic time and units characterized by a range of ages are cited in terms of Ga. The subdivisions of geologic time correspond to international standards as described in the marginal notes. All ages of individual units cited in the legend are based on high precision U/Pb zircon ages, and are cited in terms of Ma. <sup>e</sup> Granulite grade units are shown by screened overprint.

f The rocks of the Central Granulite Terrane in Quebec are coded in a lithologic sense only and represent units of ca. 1050 to 1150 Ma in age. Equivalents of these rocks are not known to be present in Ontario. g Rocks in these groups are subdivided lithologically. The order does not imply age relationship within or among groups.

h This part of the legend describes Proterozoic units of the Southern Province, and those Proterozoic units within the Superior Province. Most diabase dike and alkalic intrusive rock map units listed for the Grenville Province cut Grenville and Southern provinces; therefore, they are listed in the Southern Province part of the legend. <sup>i</sup> A generalized distribution of diabase dikes is shown. Some individual swarms occur in more than one geological province. *j* This unit has a geographic distribution from the west

shore of Lake Nipigon to the north shore of Lake Huron, including the Cutler, Chief Lake, Croker Island, English Bay and Manitoulin granites. k This unit includes the Killarney and related granitoids and equivalent metavolcanic units, as well as the Killarney area granitoids.

I This unit includes the Chelmsford, Onwatin and Onaping formations. <sup>m</sup>This unit includes the Gunflint and Rove formations.

<sup>n</sup> This unit includes the Gowganda, Lorrain, Gordon Lake and Bar River formations. <sup>o</sup> This unit was formerly classified as Algoman and/or Laurentian. Units 13, 14 and 15 are mainly Neoarchean except in areas of the Sachigo Subprovince, where

some examples of Mesoarchean age occur. P The intrusive rocks of Archean age range from approximately 2.65 Ga to 3.2 Ga. **q** This unit was formerly classified as Haileyburian.

r This unit was formerly classified as Timiskaming. This unit comprises fluvial to marine metasedimentary rocks with minor, commonly alkalic, metavolcanic rocks which locally unconformably overlie units 1 to 6. They have generally only undergone the late deformation common in greenstone belts. <sup>s</sup> These units are shown only in the English River and

Quetico subprovinces. <sup>t</sup> This unit was formerly classified as Keewatin. Most of these sequences range in age from 2.7 Ga to 2.8 Ga based on U/Pb zircon ages.

" These units are large enough to show at the map scale only within the Abitibi Subprovince, forming the Blake River Group and units south of Lake Abitibi. V The units under this heading include those greenstone

belts which are older than 2.9 Ga based on U/Pb zircon chronology. All other Archean greenstones have been placed in the Neo- to Mesoarchean subdivision of the legend WThis unit comprises those greenstone sequences in which shallow-water supermature sediments (quartz arenites, shallow-water carbonates) have been

identified. This type of unit unconformably overlies older granitoid rocks in the Steeprock Lake area, and older greenstones in the North Caribou Lake area.

## SYMBOLS

or made of the		
Geological boundary	/	
Fault (traceable on surface, traceable in subsurface)		
Iron formation	F	_
Granulite facies		
International boundary		-
Interprovincial boundary		
District, County boundary		
Geographic township boundary (surveyed, unsurveyed)	L) L	3
Railway		+
Multilane highway		
King's highway	10	and the second second
Secondary highway		
Elevation (land, water) The positions of all boundaries and surve approximate.	585m eyed lines	184m are





