

## 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: <Author’s last name>, <Initials> <year of publication>. <Content title>; Ontario Geological Survey, <Content publication series and number>, <total number of pages>p.

**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:
<b>The Reproduction of Content</b>	MNDM Publication Services	Local: (705) 670-5691 Toll Free: 1-888-415-9845, ext. 5691 (inside Canada, United States)	<a href="mailto:Pubsales@ndm.gov.on.ca">Pubsales@ndm.gov.on.ca</a>
<b>The Purchase of MNDM Publications</b>	MNDM Publication Sales	Local: (705) 670-5691 Toll Free: 1-888-415-9845, ext. 5691 (inside Canada, United States)	<a href="mailto:Pubsales@ndm.gov.on.ca">Pubsales@ndm.gov.on.ca</a>
<b>Crown Copyright</b>	Queen’s Printer	Local: (416) 326-2678 Toll Free: 1-800-668-9938 (inside Canada, United States)	<a href="mailto:Copyright@gov.on.ca">Copyright@gov.on.ca</a>

**LES CONDITIONS CI-DESSOUS RÉGISSENT L'UTILISATION DU PRÉSENT DOCUMENT.**

***Votre utilisation de ce document de la Commission géologique de l'Ontario (le « contenu ») est régie par les conditions décrites sur cette page (« conditions d'utilisation »). En téléchargeant ce contenu, vous (l'« utilisateur ») signifiez que vous avez accepté d'être lié par les présentes conditions d'utilisation.***

**Contenu :** Ce contenu est offert en l'état comme service public par le *ministère du Développement du Nord et des Mines* (MDNM) de la province de l'Ontario. Les recommandations et les opinions exprimées dans le contenu sont celles de l'auteur ou des auteurs et ne doivent pas être interprétées comme des énoncés officiels de politique gouvernementale. Vous êtes entièrement responsable de l'utilisation que vous en faites. Le contenu ne constitue pas une source fiable de conseils juridiques et ne peut en aucun cas faire autorité dans votre situation particulière. Les utilisateurs sont tenus de vérifier l'exactitude et l'applicabilité de tout contenu avant de l'utiliser. Le MDNM n'offre aucune garantie expresse ou implicite relativement à la mise à jour, à l'exactitude, à l'intégralité ou à la fiabilité du contenu. Le MDNM ne peut être tenu responsable de tout dommage, quelle qu'en soit la cause, résultant directement ou indirectement de l'utilisation du contenu. Le MDNM n'assume aucune responsabilité légale de quelque nature que ce soit en ce qui a trait au contenu.

**Liens vers d'autres sites Web :** Ce contenu peut comporter des liens vers des sites Web qui ne sont pas exploités par le MDNM. Certains de ces sites pourraient ne pas être offerts en français. Le MDNM se dégage de toute responsabilité quant à la sûreté, à l'exactitude ou à la disponibilité des sites Web ainsi reliés ou à l'information qu'ils contiennent. La responsabilité des sites Web ainsi reliés, de leur exploitation et de leur contenu incombe à la personne ou à l'entité pour lesquelles ils ont été créés ou sont entretenus (le « propriétaire »). Votre utilisation de ces sites Web ainsi que votre droit d'utiliser ou de reproduire leur contenu sont assujettis aux conditions d'utilisation propres à chacun de ces sites. Tout commentaire ou toute question concernant l'un de ces sites doivent être adressés au propriétaire du site.

**Droits d'auteur :** Le contenu est protégé par les lois canadiennes et internationales sur la propriété intellectuelle. Sauf indication contraire, les droits d'auteurs appartiennent à l'Imprimeur de la Reine pour l'Ontario.

Nous recommandons de faire paraître ainsi toute référence au contenu : nom de famille de l'auteur, initiales, année de publication, titre du document, Commission géologique de l'Ontario, série et numéro de publication, nombre de pages.

**Utilisation et reproduction du contenu :** Le contenu ne peut être utilisé et reproduit qu'en conformité avec les lois sur la propriété intellectuelle applicables. L'utilisation de courts extraits du contenu à des fins *non commerciales* est autorisée, à condition de faire une mention de source appropriée reconnaissant les droits d'auteurs de la Couronne. Toute reproduction importante du contenu ou toute utilisation, en tout ou en partie, du contenu à des fins *commerciales* est interdite sans l'autorisation écrite préalable du MDNM. Une reproduction jugée importante comprend la reproduction de toute illustration ou figure comme les graphiques, les diagrammes, les cartes, etc. L'utilisation commerciale comprend la distribution du contenu à des fins commerciales, la reproduction de copies multiples du contenu à des fins commerciales ou non, l'utilisation du contenu dans des publications commerciales et la création de produits à valeur ajoutée à l'aide du contenu.

**Renseignements :**

<b>POUR PLUS DE RENSEIGNEMENTS SUR</b>	<b>VEUILLEZ VOUS ADRESSER À :</b>	<b>PAR TÉLÉPHONE :</b>	<b>PAR COURRIEL :</b>
<b>la reproduction du contenu</b>	Services de publication du MDNM	Local : (705) 670-5691 Numéro sans frais : 1 888 415-9845, poste 5691 (au Canada et aux États-Unis)	<a href="mailto:Pubsales@ndm.gov.on.ca">Pubsales@ndm.gov.on.ca</a>
<b>l'achat des publications du MDNM</b>	Vente de publications du MDNM	Local : (705) 670-5691 Numéro sans frais : 1 888 415-9845, poste 5691 (au Canada et aux États-Unis)	<a href="mailto:Pubsales@ndm.gov.on.ca">Pubsales@ndm.gov.on.ca</a>
<b>les droits d'auteurs de la Couronne</b>	Imprimeur de la Reine	Local : 416 326-2678 Numéro sans frais : 1 800 668-9938 (au Canada et aux États-Unis)	<a href="mailto:Copyright@gov.on.ca">Copyright@gov.on.ca</a>

MARGINAL NOTES

Location: Kerns, Harley, Hudson, and Dymond Townships are in Timiskaming District between Latitudes 47°29'30" and 47°40'00" N., and between Longitudes 79°38'00" and 79°53'00" W. The community of New Liskeard is at the southern edge of the map-area and Thornloe straddles the northern boundary. Excellent access is provided by highways 11, 118, 45, 362, and 269, as well as numerous concession and lot line roads. The Ontario Northland Railway and Air Canada serve the area. There is a bushplane water airport at the south of the Wabi River. Mineral production from the map-area has been confined to construction materials.

The townships were mapped at a scale of 1 inch to 1 mile.

Mineral Exploration: Cobalt-type silver occurrences have been found in the map-area but have not seemed to warrant much development. The silver ore of the Cobalt-Gowganda area consists of epithermal carbonate veins containing minerals of silver, copper, cobalt, and silver. In Hudson Township, concession III, lot 4, an abandoned vein (circa 1900) cut into the massive quartz diabase; in concession VI, lot 12, trenching and pack-sack diamond drilling disclosed copper mineralization in quartz-carbonate veins in a fracture zone in Nipissing quartz diabase. The chalcopyrite was not in economic concentrations. Unidentified uraniferous mineralization was discovered in the area within a 250-foot long breccia zone occupying fractures in Firstbrook argillite, on the end near its contact with Nipissing 'Diabase'.

In Kerns Township, concession I, lot 12, a 240-foot long drill hole was collared in quartz diabase.

In Hudson Township, concession I, lots 4 and 5, the property of Colobucke Mines Limited is the reputed location of a high grade silver lens. Mapping, electromagnetic surveying, grab sampling, and diamond drilling were carried out between 1948 and 1949. The diamond drilling of 18 holes, totalling 1,298 feet yielded traces of gold, silver, and cobalt on analysis.

General Geology: Formations present in the map-area include from formation of Early Precambrian age; Gowganda and Lorrain Formations of the Cobalt Group of sedimentary rocks; younger Nipissing 'Diabase' and associated transition rocks and granophyre. Paleozoic rocks consist of Ordovician and Silurian limestone, shale, and sandstone. Northeast from (i.e. on the down-dip side of the Cross Lake Fault escarpment, most of the bedrock is covered by silt and clay soil of glacial lake Barlow-Ojibway.

Many of the outcrops were once wave-washed islands and reefs in Pleistocene glacial Lake Barlow-Ojibway (Boissoneau 1963; Lovell and Cairne 1970, p.5), and, on the air photographs, are readily discernible against the background of the glacial lake bottom deposits, the Little Clay Belt (Hoffman et al. 1955, p.21; Cook 1964, p.32).

Interbedded greywacke, conglomerate, and iron formation recorded in the core logs of drill holes in the southeastern part of Hudson Township constitute the only known Archean rocks in the map-area. The iron formation is composed of dark grey chert with interbedded breccia and massive pyrite and pyrrhotite. Greywacke and conglomerate are of the vapor-bearing Timiskaming type (Colobucke Mines Limited, Assessment Work Files, Reservoir Geologist's Office, Kirkland Lake). Chalcopyrite, sphalerite, and galena are disseminated in all these rocks and in numerous quartz-carbonate stringers.

The Cobalt sedimentary rocks form part of a large area of Middle Precambrian sedimentary rocks in Ontario known as the Cobalt Plate (Stockwell 1970, p.48). They comprise representatives of the Coleman and Firstbrook Members of the Gowganda Formation and the overlying Lorrain Formation (Thomson 1965, p.22). The author believes that the conglomerate of the Coleman (Lower Gowganda) Formation was laid down in fairly deep water of a glacial lake or a sea marginal to glaciated terrain to the north.

The Firstbrook Member (i.e. the Upper Gowganda Formation) is composed of well-bedded fine-grained detritus probably deposited in quiet water. The lower part of the Lorrain Formation (mainly arkosic quartzites) in northeastern Ontario is thought (Wood 1971, p.7,7a) to have originated as deposits in shallow water under conditions of high energy and cool climate, and the middle and upper parts of the Lorrain Formation during a climatic regime that warmed to tropical temperatures because the upper part of the Lorrain Formation is more 'altered' (e.g. some feldspar is altered to diaspore and kaolinite) than the lower part.

Regional metamorphism in the Gowganda and Lorrain Formations is very low grade. Chlorite exists as lenses and along slip surfaces in Nipissing 'Diabase'. In the map-area, contact metamorphism is best exemplified by chlorite spots.

Nipissing 'Diabase' of the general Cobalt area is cholelitic. Six distinct facies of Nipissing 'Diabase' are readily recognizable in the field. The chilled margin at the base of the Nipissing 'Diabase' is quartz 'Diabase' (or quartz diorite). The quartz diabase grades upward into hypersthene diabase which in turn grades upward into 'warped texture diabase', the transitional phase to the generally uppermost granophyric differentials of Nipissing 'Diabase'. Intrusive into the warped texture diabase and less commonly into the upper part of the hypersthene diabase are schlieren, patches, and dikes of diabase pegmatite. Also, granophyric dikes and granophyre occur within the diabase, but are more abundant in the upper parts. In places, the warped texture diabase grades upward into the quartz diabase zone of the roof contact.

Two, north- to northwest-trending late (Keweenaw) diabase dikes intersect Cobalt sedimentary rocks and a third, low, intrudes the hypersthene phase of the Nipissing 'Diabase'. The Paleozoic rocks of the Lake Timiskaming area outlier are of Ordovician and Silurian age. In the map-area the distribution of Paleozoic rocks is controlled by central fault blocks of the Lake Timiskaming Rift Valley. The main controlling Rift Valley fault is the Lake Timiskaming West Shore Fault.

The oldest Paleozoic formation is the Middle Ordovician Gulgus Formation, which overlies the Precambrian basement rocks unconformably and consists of sandstone and limy conglomerate.

Conformably overlying the Gulgus Formation is the Bucke Formation, which is mainly of limy and sandy beds and dark fissile shales. Dense beds of mottled limestone of the Farr Formation unconformably overlie the Bucke Formation. Disconformably overlying the Farr Formation is the fossiliferous shale of the Dawson Point Formation.

Disconformably overlying the Dawson Point Formation is the Wabi Formation of Silurian age. It consists of layers of limestone interbedded with thin layers of shale. The Thornloe Formation, also Silurian in age, consists of yellowish brown to pink grey strata that were originally fragmental limestones and are now dolomitic.

Pleistocene and Recent deposits consist of glacial till (ground moraine), detrital sand, lake bottom clay and silt, and overlying stream sediments and peat.

Structural Geology: The most prominent faulting in the map-area is the northwest-trending Lake Timiskaming Rift system, which is a branch of the Ottawa-Kemuncere graben. Less prominent are the north-striking faults.

The most important northwest-striking faults in the map-area are the Cross Lake Fault and the Lake Timiskaming West Shore Fault.

The only folds seen in the map-area are those in Cobalt sedimentary rocks affected by thermal and dynamic metamorphism resulting from intrusion by Nipissing 'Diabase'.

The main expanse of Paleozoic strata forms a homocline dipping gently (about 3°) southwest towards the Lake Timiskaming West Shore Fault.

Economic Geology: Although in the map-area potential might exist for metal production (silver-cobalt-nickel-copper ore), only industrial minerals have been economically exploited. Limestone is used for road fill, for lime kilns, and in the manufacture of paper pulp. Limestone, used for building stone, is quarried 3 and 6 miles south of the map-area; and the same formations extend into the map-area. Possible new uses of limestone of the Lake Timiskaming Paleozoic outlier, which is near railroads, could be as a wetter flux, and for neutralizing acidic mine tailings and other industrial wastes.

Clay of the New Liskeard area has been used for the manufacture of brick, by adding sand or finely ground diabase from mills of the Cobalt mines, a suitable quality of brick was obtained from the Paleozoic limestone at the Liskeard Coal and Lumber Company (1906). In 1965, a new tile yard was built by V.C. Shearman in Dymond Township, 2 1/2 miles west of New Liskeard. The clay was taken from the valley of the south branch of Wabi Creek about 300 feet east of the plant.

In adjacent northern parts of Kerns and Harley Townships is the Thornloe peat bog.

References:

Boissoneau, A.N. 1963: Algonia, Sudbury, Timiskaming, and Nipissing surficial geology; Ontario Dept. Lands and Forests Map S465.

Cook, M.F. 1964: Agricultural land in Timiskaming District, an economic survey of the District of Timiskaming, Northwestern Ontario Development Association, North Bay, p.52-53.

Hoffman, D.W., Wickland, R.E., and Richards, N.R. 1955: Soil survey of New Liskeard-Englehart area; Ontario soil survey Rep. 21, Experimental Farm Service, Dominion Dept. Agriculture and the Ontario Agriculture College, 90p, and 1 map.

Lovell, H.L., and Cairne, I.W. 1970: Lake Timiskaming Rift Valley; Ontario Dept. Mines, M39, 15p.

Stockwell, C.H. 1970: Geology of the Canadian Shield, p.48 in Economic Geology of Canada; Geol. Surv. Canada, Econ. Geol. Rept. 1, 83pp.

Thomson, R. 1965: Casey and Harris Townships; Ontario Dept. Mines, GR38, 77p, and 3 maps.

Wood, J. 1971: Environments during deposition of Upper Huronian rocks of the Roubidou Lake-Black Lake area, Ontario; Geol. Assoc. Canada-Min. Assoc. Canada abstracts of papers, p.73-75.



ONTARIO  
DIVISION OF MINES  
HONOURABLE LEO BERNIER, Minister of Natural Resources  
W. O. MACNEE, Deputy Minister of Natural Resources  
G.A. Jewett, Executive Director, Division of Mines E.G. Pyle, Director, Geological Branch  
PRELIMINARY MAP P. 785  
GEOLOGICAL SERIES

**HARLEY TOWNSHIP**  
DISTRICT OF TIMISKAMING  
Scale 1 inch to 1 mile  
NTS Reference: 31 M/12  
ODM-GSC Aeromagnetic Maps: 14930, 5140  
ODM Geological Compilation Series Map: 2066  
© ODM 1972  
Parts of this publication may be quoted if credit is given to the Ontario Division of Mines and the material is properly referenced.

LEGEND

QUATERNARY	
Pleistocene and Recent	
Till, clay, sand, gravel	
Unconformity	
PALEOZOIC	
SILURIAN	
12	LOWER AND MIDDLE SILURIAN
11	12 Thornloe Formation: limestone
	11 Wabi Formation: impure limestone interbedded with shale (ripple marks)
	Disconformity
ORDOVICIAN	
MIDDLE AND UPPER ORDOVICIAN	
10	Liskeard Group
	10 Dawson Point Formation: fossiliferous shale
	10 Farr Formation: limestone
	10 Bucke Formation: limy, sandy beds and shales
	10 Gulgus Formation: sandstone and conglomerate
	Unconformity
PRECAMBRIAN	
MIDDLE PRECAMBRIAN	
9	9 Diabase
MAFIC INTRUSIVE ROCKS (Keweenaw)	
MIDDLE PRECAMBRIAN	
MAFIC INTRUSIVE ROCKS (Nipissing)	
8	8 Granophyre
7	7 Transition
6	6a Quartz diabase
	6b Hypersthene diabase
	Intrusive Contact
HURONIAN	
5	Cobalt Group
	5 Lorrain Formation
	5a Quartzite
	5b Arkose
4	Gowganda Formation
	4 Firstbrook Member
	4 Argillite
3	Coleman Member
	3a Conglomerate
	3b Quartzite
	3c Argillite
	Unconformity
EARLY PRECAMBRIAN (ARCHEAN)	
2	2 MAFIC INTRUSIVE ROCKS (ALGONIA)
	2 Lamprophyre
	Intrusive Contact
METASEDIMENTS (TIMISKAMING)	
1	1a Conglomerate
	1b Greywacke
	1c Iron Formation

This is basically a Field Legend and may be changed as a result of subsequent laboratory investigations.

**GEOLOGICAL AND MINING SYMBOLS**

Glacial striae.	Syncline.
Small bedrock outcrop.	Drill hole; (inclined).
Area of bedrock outcrop.	Gravel pit.
Bedding, horizontal.	MA Magnetic attraction.
Bedding, top unknown; (inclined, vertical).	Unsurveyed mining property.
Geological boundary, observed.	Water well, bedrock intersected, with thickness(es) of overburden in feet.
Geological boundary, position interpreted.	Water well, bedrock not intersected, with thickness(es) of overburden in feet.
Fault; assumed. Spot indicates down throw side.	Contour lines. Height above sea level in feet.
Jointing; (inclined, vertical).	

**MINERAL REFERENCES**

cp ..... Chalcopyrite hem ..... Hematite

**WATER WELL ABBREVIATIONS**

blbr ..... Boulders hpan ..... Hardpan  
csnd ..... Coarse-grained sand msnd ..... Medium-grained sand  
fsnd ..... Fine-grained sand ov ..... Overburden, unshaded  
grvl ..... Gravel gend ..... Gravel

**SOURCES OF INFORMATION**

Geology by H.L. Lovell, E.D. Frey, and I.W. Cairne, 1970. Geology Assessment work and additional reports on file at Kirkland Lake Resident Geologist's office.

Base maps derived from maps of Forest Resources Inventory, Division of Lands, Ministry of Natural Resources, with revisions by H.L. Lovell.

Topography transferred from National Topographic Series areas 31 M/5 and 31 M/12.

Water well data from the Ontario Water Resources Commission, Division of Water Resources, 1971.

Burrows, A.C. and Hopkins, J.E., Blanche River Area, ODM Ann. Rept., Vol. 31, Part 3, 1922 and ODM Map 31b, 1922.

Dominion Dept. of Agriculture, Map 21, Soil map of the New Liskeard-Englehart area, 1955.

Geology of northeastern Harley Township projected from ODM Map 2066, Casey and Harris Townships.

Magnetic declination approximately 9°13'W, 1970.

Issued 1972

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

Lovell, H.L., Frey, E.D., and Cairne, I.W.  
1972: Harley Township, District of Timiskaming, Ontario Div. Mines, Prelim. Map P.785, Geol. Ser., scale 1 inch to 1 mile.