

## 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:
The Reproduction of Content	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>
The Purchase of MNDM Publications	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>
Crown Copyright	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

Preliminary field work was initiated by J.D. Morton in 1972. Reconnaissance mapping was initiated in May and completed during September, 1977. Assistance was provided by R.C.F. King through out the duration of mapping and by M.W. Kalin, P. Entwistle and J. A. Hanley for major portions thereof. Mr. King carried out a large part of the airphoto interpretation, and prepared the preliminary map at 1:50 000 scale. All field mapping was carried out at 1:20 000 scale on a township basis and reduced for final presentation at 1:50 000 scale. The project was performed under contract between Morton, Dodds & Partners Limited and the Ontario Ministry of Natural Resources.

PHYSIOGRAPHY: The physiography of the New Liskeard map-area is strongly controlled by the NNW-SSE-trending Timiskaming Fault system which involves rocks of Early Proterozoic to Middle Paleozoic Age. The structural control is sufficiently pronounced that the area may be readily divided into four distinct regions:

- a) the hilly rocky uplands of the southwest and west, lying between the Montreal River and Cross Lake Faults;
b) the broad clay plain and intermediate terraces of the Wabi Valley, lying between the Cross Lake Fault and the uplifted flank of the Dawson Point Cuesta;
c) a central limestone upland, formed along the Dawson Point Cuesta;
d) the flat alluvial plain and delta of the Blanche River lying to the west of the Paleozoic limestone escarpment.

Two minor subregions occur within or border on the Blanche Valley. These are:
i) the re-emergent Precambrian hill feature of Casey Mountain and
ii) the dissected edge of an extensive late glacial terrace or delta fringe feature which extends into the northeastern corner of the area (in Brethour Township) from the vicinity of Roulier, in Montreuil Township, Quebec.

BEDROCK GEOLOGY: The New Liskeard map-area is underlain by rocks of Precambrian and Lower to Middle Paleozoic age. The Precambrian rocks which outcrop in the area to the west of the Lake Timiskaming West Shore Fault, and in Casey Mountain and the isolated rocky hills of Harris and Brethour Townships, are overlain in the central part of the map-area by an outlier of Paleozoic rock. This elongate outlier extends in a northwesterly direction from a southernmost outcrop on Isle du College in Lake Timiskaming to the town of Englehart just north of the northern boundary of the map-area. The western and northern margins of the outlier are fault controlled.

PRECAMBRIAN (Unit 1): The two main groups within the Precambrian comprise the Middle Precambrian rocks of the Cobalt Group which contained Nipissing Diabase intrusives, and Early Precambrian meta-morphosed sedimentary rocks, volcanic rocks, and felsic intrusive rocks. Rocks of the Cobalt Group comprise conglomerates, quartzites and wackes (the Coleman Member) and argillites (the Firstbrook Member) of the Gowanda Formation, which are overlain by arkose and quartzites of the Lorrain Formation. The Nipissing Diabase was intruded into or adjacent to these units in the form of an extensive uneven sill. The Gowanda Formation units are believed to represent tillites and varves deposited during an extended period of Precambrian glaciation.

Early Precambrian rocks occur less extensively, with small outcrops of metavolcanics, meta-sediments and felsic intrusive rocks visible in Casey, Hudson and Beauchamp Townships.

All Precambrian rocks are grouped together on this map as Map Unit 1.

PALEOZOIC (Units 2): Paleozoic rocks within the map-area unconformably overlie the folded, tilted, meta-morphosed and Precambrian units. The contact is highly irregular as can be seen in a series of isolated outcrops adjacent to Hwy. 65 to the west of Casey Mountain, and along the adjacent section of shoreline of Lake Timiskaming. Similarly, an uneven basal contact is evident in a secondary outlier (irregular outlier extension) which occurs to the west of the Timiskaming West Shore Fault in the hilly uplands to the west of New Liskeard.

The main outlier subregion beneath much of the Wabi Creek and parts of the Blanche River valleys, with infrequent outcrops along the central cuestas and in the upland area due west of New Liskeard. A secondary outlier has been reported beneath the Blanche Valley to the east of Casey Mountain but evidence for this is questionable (R. Thompson 1982).

The main body of Paleozoics are fault-dipped west-southwestwards by downthrow along the Timiskaming West Shore Fault. A more irregular interval structure is reported for the less extensive thinner outliers located on the western side of the Timiskaming West Shore Fault (Lovell and Frey 1976; R. Thompson 1985), and here the dips are generally eastward or southward.

The Paleozoic sequence consists of interbedded shales, mudstones, thin to more massively bedded sandstones and limestones, and major limestone and dolostones. A discontinuity between the Liskeard Formation of late Ordovician age and the base of the Wabi Formation of early Silurian age has been identified by Hume, 1925. Correlation with Paleozoic rocks of Southern Ontario suggests equivalence with a sequence extending from the uppermost part of the Trenton Black River Group of Middle Ordovician age to at least the top of the Middle Silurian Clinton Group (Caley and Liberty 1957; O'Brien and MacQueen 1960; Bolton and Copeland 1972; Sinclair 1980; Thompson 1985). Consideration that the uppermost massive dolomite beds are equivalent in part to the Lockport Formation of the Niagara Escarpment area (Hume 1925) is now discounted (Thompson 1985).

A basin relief of greater than 70 m is implied for the Paleozoic floor from outcrop distribution on the western and southern sides of Casey Mountain.

QUATERNARY GEOLOGY: TILL (Units 3 and 4): Till fabric analysis and stratigraphic on newly exposed bedrock suggest a southerly ice flow, with deviation to a pronounced southerly flow or cross-flow evident on Casey Mountain. Some control of ice flow direction by local relief is evident on the escarpment to the west of New Liskeard. The till within the area is stony to bouldery. In Precambrian terrane it is very stony with predominantly Precambrian clasts. Within and adjacent to Paleozoic rocks the till has a sandy silt texture and is calcareous, containing numerous Paleozoic clasts.

ICE CONTACT AND OUTWASH DEPOSITS (Units 5 and 6):

1. Bouldery Moraine: This moraine feature which only protrudes at intervals through a thick mantle of postglacial lacustrine, beach and deltaic sediments, extends southwards from the immediate vicinity of Judas in Casey Township for several kilometers into the Province of Quebec. It appears to mark a short term frontal position of the Laurentide Ice Sheet, and several slump of ice contact features are present on the northeastern side. Fabric analysis of the till-like bouldery mantle present on the northeast flank of an exposure in a disused quarry at Judas shows a strong westward depositional component. The body of the moraine comprises mixed undifferentiated and water-sorted silts, sands and gravels in which slump features and small faults are frequently evident. Large angular to subrounded boulders are common particularly in the mantle layer, and as irregular boulder pavement on the flanking postglacial beaches.

2. Hill Lake Moraine: This major glacial feature in the northwestern corner of the map-area dominates the surrounding terrain and comprises a series of kame-like deposits positioned along the line of the Cross Lake Fault Escarpment. The complex is interpreted as being a series of marginal, lateral and interlobate moraines developed as the fronts of the contiguous Hudson Bay and Laurentide ice sheets retreated to the north and northeast respectively. The moraines cover, in part, the prominent Hammond Lake and Kenabeek Esker systems and are associated with an aqueduct spillway system which discharged southwards along the line of the Cross Lake Fault Escarpment, while a lower series of glacial sands and gravels are mantled by one to two metres of bouldery till. Fabric study of the till mantle indicates a general southward depositional component. Several ice push features are evident in one exposure, at the base of the surficial till veneer. The moraine is considered to be linked westward by sub-parallel to the strongly developed Roulier Moraine.

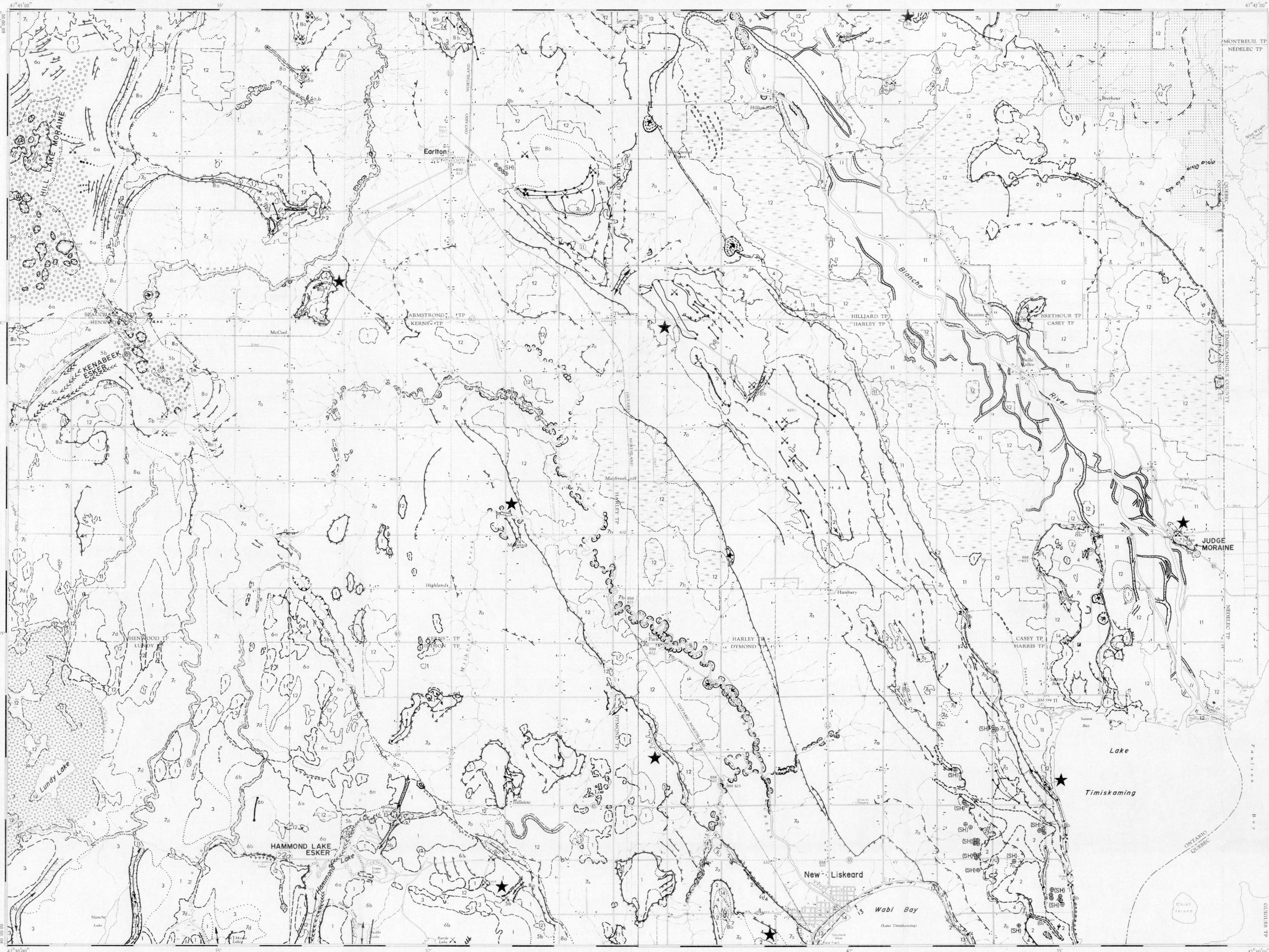
3. Armstrong-Beauchamp Township Boundary Complex: This glacial-fluvial feature which protrudes at intervals through a thick mantle of terraced glaciolacustrine varved clays and silts along the line of Armstrong and Beauchamp Township boundary, appears to be of possibly mixed origin comprising a series of kame nodules strung along a large buried esker. The southern end of the feature is the rock till complex which forms the prominent hill some 2 km west of Earlon Airport. Kame nodules protrude above the varved clay terrace level in concavities V and VI of Armstrong Township, where the sands and gravels have been worked as a granular resource. Current bedded sands with a trace of fine gravel outcrop in the floor of the intervening valley where they can be seen to pass upwards conformably into thick varved sands, varved silts and varved silts and clays. Depositional features exposed in several of the gravel pits suggest lateral ice margin conditions with the possibility of minor ice thrusting. The bulk of the feature comprises clean esker sands and gravels, however, with almost unsorted and marginal truncation into glaciolacustrine clay silt rhythmites or contorted till mantle.

4. Moraine Feature, Hilliard Township: This moraine is composed of silts, sands and gravel derived from the north or northeast, in which a lower series of glaciolacustrine sands and gravels are mantled by one to two metres of bouldery till. Fabric study of the till mantle indicates a general southward depositional component. Several ice push features are evident in one exposure, at the base of the surficial till veneer. The moraine is considered to be linked westward by sub-parallel to the strongly developed Roulier Moraine.

5. BEACH BAR AND SPIT DEPOSITS (Unit 8): Numerous beach terraces and associated bars, spits, tombolos, strand lines, wet beaches and shoreline cliffs were developed throughout the map-area during the multi-stage development and regression of glacial Lakes Barlow, Ojibway and Barlow. Storm beaches and bars are well developed on the moraine and till ridge materials along the central cuestas, where they have been worked on extensively for granular borrow. Such features are less prominently developed on the varved clays, but many fine examples of sand spits and wet beaches are nevertheless well represented in areas where bordering sand deposits have been removed by sheetwash and wave action.

6. CLAYAL AND EARLY POSTGLACIAL LAKE DELTA SEDIMENTS OLDER ALLUVIUM (Unit 9): In the northern part of Brethour Township, thin sand and silt fine sand deposits overlie terraced varved clay and are considered to be representative of advancing delta front formed as the waters of Lake Barlow receded southward. The sands have been partially reworked as offset beach or terrace sediments, but their connection northward and eastward with the extensive delta and outwash sand plain deposits near Roulier in Montreuil Township, Temiscamingue County, Quebec is clearly developed. These thin sands and silts have been mapped as a stepped outcrop. A later stage delta front occurs in the floor of the Blanche Valley at Hilliardton.

Several finer terrace occur in tributary valleys such as those of Eversure, Wabi and Milberta Creeks. Many of such remnants are too small to map but sufficient exist to be able to project the operating base level of the creek during their formation.



A maximum thickness for the clay and silt rhythmic sequence of about 60 m is indicated by combining bridge elevations and valley sections, with a reduced general thickness of 15-27 m being apparent on the broad terraces located to either side of the main Blanche and Wabi Valleys. Within Lundy Township the clays have been partially reworked during a slow recession period of early glacial Lake Barlow Ojibway, to give a sequence of alluvial clay silts overlying varved clays and silts.

The Kenabeek Esker system which disappears beneath the southwestern margin of the moraine indicates a northward retreat of the ice front from the Montreal River Valley to the Cross Lake Fault Escarpment. This contrasts strongly to the north-south orientation of the Hammond Lake and Armstrong Esker which lie on the line or to the east of the Cross Lake Fault Escarpment.

7. FINE-GRAINED LACUSTRINE DEPOSITS (Unit 7): Fine sand, silts and clays form the major visible and influential Pleistocene deposits of the area. Last down from the various proglacial and postglacial lakes, the sediments take the form of rhythmic varved sand varves adjacent to outwash areas to clay and silt waters under more distal conditions. The southern end of the feature is the rock till complex which forms the prominent hill some 2 km west of Earlon Airport. Kame nodules protrude above the varved clay terrace level in concavities V and VI of Armstrong Township, where the sands and gravels have been worked as a granular resource. Current bedded sands with a trace of fine gravel outcrop in the floor of the intervening valley where they can be seen to pass upwards conformably into thick varved sands, varved silts and varved silts and clays. Depositional features exposed in several of the gravel pits suggest lateral ice margin conditions with the possibility of minor ice thrusting. The bulk of the feature comprises clean esker sands and gravels, however, with almost unsorted and marginal truncation into glaciolacustrine clay silt rhythmites or contorted till mantle.

8. RECENT BEACH DEPOSITS (Unit 13): Sand and gravel beach deposits have been developed throughout the map-area during the multi-stage development and regression of glacial Lakes Barlow, Ojibway and Barlow. Storm beaches and bars are well developed on the moraine and till ridge materials along the central cuestas, where they have been worked on extensively for granular borrow. Such features are less prominently developed on the varved clays, but many fine examples of sand spits and wet beaches are nevertheless well represented in areas where bordering sand deposits have been removed by sheetwash and wave action.

9. BLOCK FIELD (FELSENMEER): Associated with the hummocky bedrock of Lundy Township is a thin veneer of block field and boulder lag deposits developed subsequent to the high water phase of glacial Lake Barlow-Ojibway by wave and frost action. The block fields are characteristic of an extensive area of predominantly flat-lying well-bedded argillites of the Firstbrook Member, Gowanda Formation, and appear to extend southward towards the Montreal River. The visible cover of frost shattered blocks and boulders does not appear to be developed on the more massive units of the Gowanda Formation or other Precambrian rocks.

Entire sections of till cover have been removed from the rock hills, and knobs of the southwest upland with occasional remnants visible only in sheltered hollows on the southeastern flanks or on the tops of the higher hills above maximum water plane.

The major areas of peat are developed in the middle Wabi Valley and as back swamp deposits flanking both sides of the Blanche River. The major deposit at Maybrook, in Harley Township appears to have accumulated in what was initially a cut-off marsh section (back-swamp) which formed from the Lake Timiskaming by the advancing deltaic deposition of pro-Wabi Creek.

All the foregoing materials have been grouped into Unit 9.

10. EOLIAN SANDS (Unit 10): A small area of sand plain to the west of Hammond Lake exhibits arcuate sand dune features on the surface. These have been degraded by subsequent subaerial erosion. The sands are of fine to medium grain size. The dune area has been designated as Map Unit 12.

11. MAN-MADE DEPOSITS (Unit 14): Mine waste from the Casey Mountain mine workings form the major instance of cultural deposits in the area, occupying the margin of an extensive low terrace at Sutton Bay. Some 11 ha are involved. In addition, a considerable area of earthen and clean rubble fill has been placed along the shoreline of Lake Timiskaming in the town of New Liskeard, to provide recreational facilities along Wabi Bay.

12. AREAS OF TIPPED GARBAGE are found throughout the area, mostly confined to disused quarry workings or sand and gravel pits. Man-made deposits have been mapped as Unit 14; they have not been subdivided.

13. BLOCK FIELD (FELSENMEER): Associated with the hummocky bedrock of Lundy Township is a thin veneer of block field and boulder lag deposits developed subsequent to the high water phase of glacial Lake Barlow-Ojibway by wave and frost action. The block fields are characteristic of an extensive area of predominantly flat-lying well-bedded argillites of the Firstbrook Member, Gowanda Formation, and appear to extend southward towards the Montreal River. The visible cover of frost shattered blocks and boulders does not appear to be developed on the more massive units of the Gowanda Formation or other Precambrian rocks.

Entire sections of till cover have been removed from the rock hills, and knobs of the southwest upland with occasional remnants visible only in sheltered hollows on the southeastern flanks or on the tops of the higher hills above maximum water plane.

The major areas of peat are developed in the middle Wabi Valley and as back swamp deposits flanking both sides of the Blanche River. The major deposit at Maybrook, in Harley Township appears to have accumulated in what was initially a cut-off marsh section (back-swamp) which formed from the Lake Timiskaming by the advancing deltaic deposition of pro-Wabi Creek.

14. RECENT BEACH DEPOSITS (Unit 13): Sand and gravel beach deposits have been developed throughout the map-area during the multi-stage development and regression of glacial Lakes Barlow, Ojibway and Barlow. Storm beaches and bars are well developed on the moraine and till ridge materials along the central cuestas, where they have been worked on extensively for granular borrow. Such features are less prominently developed on the varved clays, but many fine examples of sand spits and wet beaches are nevertheless well represented in areas where bordering sand deposits have been removed by sheetwash and wave action.

15. BLOCK FIELD (FELSENMEER): Associated with the hummocky bedrock of Lundy Township is a thin veneer of block field and boulder lag deposits developed subsequent to the high water phase of glacial Lake Barlow-Ojibway by wave and frost action. The block fields are characteristic of an extensive area of predominantly flat-lying well-bedded argillites of the Firstbrook Member, Gowanda Formation, and appear to extend southward towards the Montreal River. The visible cover of frost shattered blocks and boulders does not appear to be developed on the more massive units of the Gowanda Formation or other Precambrian rocks.

Entire sections of till cover have been removed from the rock hills, and knobs of the southwest upland with occasional remnants visible only in sheltered hollows on the southeastern flanks or on the tops of the higher hills above maximum water plane.

The major areas of peat are developed in the middle Wabi Valley and as back swamp deposits flanking both sides of the Blanche River. The major deposit at Maybrook, in Harley Township appears to have accumulated in what was initially a cut-off marsh section (back-swamp) which formed from the Lake Timiskaming by the advancing deltaic deposition of pro-Wabi Creek.

Entire sections of till cover have been removed from the rock hills, and knobs of the southwest upland with occasional remnants visible only in sheltered hollows on the southeastern flanks or on the tops of the higher hills above maximum water plane.

The major areas of peat are developed in the middle Wabi Valley and as back swamp deposits flanking both sides of the Blanche River. The major deposit at Maybrook, in Harley Township appears to have accumulated in what was initially a cut-off marsh section (back-swamp) which formed from the Lake Timiskaming by the advancing deltaic deposition of pro-Wabi Creek.

Entire sections of till cover have been removed from the rock hills, and knobs of the southwest upland with occasional remnants visible only in sheltered hollows on the southeastern flanks or on the tops of the higher hills above maximum water plane.

16. RECENT BEACH DEPOSITS (Unit 13): Sand and gravel beach deposits have been developed throughout the map-area during the multi-stage development and regression of glacial Lakes Barlow, Ojibway and Barlow. Storm beaches and bars are well developed on the moraine and till ridge materials along the central cuestas, where they have been worked on extensively for granular borrow. Such features are less prominently developed on the varved clays, but many fine examples of sand spits and wet beaches are nevertheless well represented in areas where bordering sand deposits have been removed by sheetwash and wave action.

17. BLOCK FIELD (FELSENMEER): Associated with the hummocky bedrock of Lundy Township is a thin veneer of block field and boulder lag deposits developed subsequent to the high water phase of glacial Lake Barlow-Ojibway by wave and frost action. The block fields are characteristic of an extensive area of predominantly flat-lying well-bedded argillites of the Firstbrook Member, Gowanda Formation, and appear to extend southward towards the Montreal River. The visible cover of frost shattered blocks and boulders does not appear to be developed on the more massive units of the Gowanda Formation or other Precambrian rocks.

Entire sections of till cover have been removed from the rock hills, and knobs of the southwest upland with occasional remnants visible only in sheltered hollows on the southeastern flanks or on the tops of the higher hills above maximum water plane.

The major areas of peat are developed in the middle Wabi Valley and as back swamp deposits flanking both sides of the Blanche River. The major deposit at Maybrook, in Harley Township appears to have accumulated in what was initially a cut-off marsh section (back-swamp) which formed from the Lake Timiskaming by the advancing deltaic deposition of pro-Wabi Creek.

Entire sections of till cover have been removed from the rock hills, and knobs of the southwest upland with occasional remnants visible only in sheltered hollows on the southeastern flanks or on the tops of the higher hills above maximum water plane.

The major areas of peat are developed in the middle Wabi Valley and as back swamp deposits flanking both sides of the Blanche River. The major deposit at Maybrook, in Harley Township appears to have accumulated in what was initially a cut-off marsh section (back-swamp) which formed from the Lake Timiskaming by the advancing deltaic deposition of pro-Wabi Creek.

Entire sections of till cover have been removed from the rock hills, and knobs of the southwest upland with occasional remnants visible only in sheltered hollows on the southeastern flanks or on the tops of the higher hills above maximum water plane.

18. RECENT BEACH DEPOSITS (Unit 13): Sand and gravel beach deposits have been developed throughout the map-area during the multi-stage development and regression of glacial Lakes Barlow, Ojibway and Barlow. Storm beaches and bars are well developed on the moraine and till ridge materials along the central cuestas, where they have been worked on extensively for granular borrow. Such features are less prominently developed on the varved clays, but many fine examples of sand spits and wet beaches are nevertheless well represented in areas where bordering sand deposits have been removed by sheetwash and wave action.

19. BLOCK FIELD (FELSENMEER): Associated with the hummocky bedrock of Lundy Township is a thin veneer of block field and boulder lag deposits developed subsequent to the high water phase of glacial Lake Barlow-Ojibway by wave and frost action. The block fields are characteristic of an extensive area of predominantly flat-lying well-bedded argillites of the Firstbrook Member, Gowanda Formation, and appear to extend southward towards the Montreal River. The visible cover of frost shattered blocks and boulders does not appear to be developed on the more massive units of the Gowanda Formation or other Precambrian rocks.

Entire sections of till cover have been removed from the rock hills, and knobs of the southwest upland with occasional remnants visible only in sheltered hollows on the southeastern flanks or on the tops of the higher hills above maximum water plane.

The major areas of peat are developed in the middle Wabi Valley and as back swamp deposits flanking both sides of the Blanche River. The major deposit at Maybrook, in Harley Township appears to have accumulated in what was initially a cut-off marsh section (back-swamp) which formed from the Lake Timiskaming by the advancing deltaic deposition of pro-Wabi Creek.

Entire sections of till cover have been removed from the rock hills, and knobs of the southwest upland with occasional remnants visible only in sheltered hollows on the southeastern flanks or on the tops of the higher hills above maximum water plane.

The major areas of peat are developed in the middle Wabi Valley and as back swamp deposits flanking both sides of the Blanche River. The major deposit at Maybrook, in Harley Township appears to have accumulated in what was initially a cut-off marsh section (back-swamp) which formed from the Lake Timiskaming by the advancing deltaic deposition of pro-Wabi Creek.

Entire sections of till cover have been removed from the rock hills, and knobs of the southwest upland with occasional remnants visible only in sheltered hollows on the southeastern flanks or on the tops of the higher hills above maximum water plane.

20. RECENT BEACH DEPOSITS (Unit 13): Sand and gravel beach deposits have been developed throughout the map-area during the multi-stage development and regression of glacial Lakes Barlow, Ojibway and Barlow. Storm beaches and bars are well developed on the moraine and till ridge materials along the central cuestas, where they have been worked on extensively for granular borrow. Such features are less prominently developed on the varved clays, but many fine examples of sand spits and wet beaches are nevertheless well represented in areas where bordering sand deposits have been removed by sheetwash and wave action.

21. BLOCK FIELD (FELSENMEER): Associated with the hummocky bedrock of Lundy Township is a thin veneer of block field and boulder lag deposits developed subsequent to the high water phase of glacial Lake Barlow-Ojibway by wave and frost action. The block fields are characteristic of an extensive area of predominantly flat-lying well-bedded argillites of the Firstbrook Member, Gowanda Formation, and appear to extend southward towards the Montreal River. The visible cover of frost shattered blocks and boulders does not appear to be developed on the more massive units of the Gowanda Formation or other Precambrian rocks.

Entire sections of till cover have been removed from the rock hills, and knobs of the southwest upland with occasional remnants visible only in sheltered hollows on the southeastern flanks or on the tops of the higher hills above maximum water plane.

The major areas of peat are developed in the middle Wabi Valley and as back swamp deposits flanking both sides of the Blanche River. The major deposit at Maybrook, in Harley Township appears to have accumulated in what was initially a cut-off marsh section (back-swamp) which formed from the Lake Timiskaming by the advancing deltaic deposition of pro-Wabi Creek.

Entire sections of till cover have been removed from the rock hills, and knobs of the southwest upland with occasional remnants visible only in sheltered hollows on the southeastern flanks or on the tops of the higher hills above maximum water plane.

The major areas of peat are developed in the middle Wabi Valley and as back swamp deposits flanking both sides of the Blanche River. The major deposit at Maybrook, in Harley Township appears to have accumulated in what was initially a cut-off marsh section (back-swamp) which formed from the Lake Timiskaming by the advancing deltaic deposition of pro-Wabi Creek.

Entire sections of till cover have been removed from the rock hills, and knobs of the southwest upland with occasional remnants visible only in sheltered hollows on the southeastern flanks or on the tops of the higher hills above maximum water plane.

22. RECENT BEACH DEPOSITS (Unit 13): Sand and gravel beach deposits have been developed throughout the map-area during the multi-stage development and regression of glacial Lakes Barlow, Ojibway and Barlow. Storm beaches and bars are well developed on the moraine and till ridge materials along the central cuestas, where they have been worked on extensively for granular borrow. Such features are less prominently developed on the varved clays, but many fine examples of sand spits and wet beaches are nevertheless well represented in areas where bordering sand deposits have been removed by sheetwash and wave action.

23. BLOCK FIELD (FELSENMEER): Associated with the hummocky bedrock of Lundy Township is a thin veneer of block field and boulder lag deposits developed subsequent to the high water phase of glacial Lake Barlow-Ojibway by wave and frost action. The block fields are characteristic of an extensive area of predominantly flat-lying well-bedded argillites of the Firstbrook Member, Gowanda Formation, and appear to extend southward towards the Montreal River. The visible cover of frost shattered blocks and boulders does not appear to be developed on the more massive units of the Gowanda Formation or other Precambrian rocks.

Entire sections of till cover have been removed from the rock hills, and knobs of the southwest upland with occasional remnants visible only in sheltered hollows on the southeastern flanks or on the tops of the higher hills above maximum water plane.

The major areas of peat are developed in the middle Wabi Valley and as back swamp deposits flanking both sides of the Blanche River. The major deposit at Maybrook, in Harley Township appears to have accumulated in what was initially a cut-off marsh section (back-swamp) which formed from the Lake Timiskaming by the advancing deltaic deposition of pro-Wabi Creek.

Entire sections of till cover have been removed from the rock hills, and knobs of the southwest upland with occasional remnants visible only in sheltered hollows on the southeastern flanks or on the tops of the higher hills above maximum water plane.

The major areas of peat are developed in the middle Wabi Valley and as back swamp deposits flanking both sides of the Blanche River. The major deposit at Maybrook, in Harley Township appears to have accumulated in what was initially a cut-off marsh section (back-swamp) which formed from the Lake Timiskaming by the advancing deltaic deposition of pro-Wabi Creek.

Entire sections of till cover have been removed from the rock hills, and knobs of the southwest upland with occasional remnants visible only in sheltered hollows on the southeastern flanks or on the tops of the higher hills above maximum water plane.

24. RECENT BEACH DEPOSITS (Unit 13): Sand and gravel beach deposits have been developed throughout the map-area during the multi-stage development and regression of glacial Lakes Barlow, Ojibway and Barlow. Storm beaches and bars are well developed on the moraine and till ridge materials along the central cuestas, where they have been worked on extensively for granular borrow. Such features are less prominently developed on the varved clays, but many fine examples of sand spits and wet beaches are nevertheless well represented in areas where bordering sand deposits have been removed by sheetwash and wave action.

25. BLOCK FIELD (FELSENMEER): Associated with the hummocky bedrock of Lundy Township is a thin veneer of block field and boulder lag deposits developed subsequent to the high water phase of glacial Lake Barlow-Ojibway by wave and frost action. The block fields are characteristic of an extensive area of predominantly flat-lying well-bedded argillites of the Firstbrook Member, Gowanda Formation, and appear to extend southward towards the Montreal River. The visible cover of frost shattered blocks and boulders does not appear to be developed on the more massive units of the Gowanda Formation or other Precambrian rocks.

Entire sections of till cover have been removed from the rock hills, and knobs of the southwest upland with occasional remnants visible only in sheltered hollows on the southeastern flanks or on the tops of the higher hills above maximum water plane.

The major areas of peat are developed in the middle Wabi Valley and as back swamp deposits flanking both sides of the Blanche River. The major deposit at Maybrook, in Harley Township appears to have accumulated in what was initially a cut-off marsh section (back-swamp) which formed from the Lake Timiskaming by the advancing deltaic deposition of pro-Wabi Creek.

Entire sections of till cover have been removed from the rock hills, and knobs of the southwest upland with occasional remnants visible only in sheltered hollows on the southeastern flanks or on the tops of the higher hills above maximum water plane.

The major areas of peat are developed in the middle Wabi Valley and as back swamp deposits flanking both sides of the Blanche River. The major deposit at Maybrook, in Harley Township appears to have accumulated in what was initially a cut-off marsh section (back-swamp) which formed from the Lake Timiskaming by the advancing deltaic deposition of pro-Wabi Creek.

Entire sections of till cover have been removed from the rock hills, and knobs of the southwest upland with occasional remnants visible only in sheltered hollows on the southeastern flanks or on the tops of the higher hills above maximum water plane.

26. RECENT BEACH DEPOSITS (Unit 13): Sand and gravel beach deposits have been developed throughout the map-area during the multi-stage development and regression of glacial Lakes Barlow, Ojibway and Barlow. Storm beaches and bars are well developed on the moraine and till ridge materials along the central cuestas, where they have been worked on extensively for granular borrow. Such features are less prominently developed on the varved clays, but many fine examples of sand spits and wet beaches are nevertheless well represented in areas where bordering sand deposits have been removed by sheetwash and wave action.

27. BLOCK FIELD (FELSENMEER): Associated with the hummocky bedrock of Lundy Township is a thin veneer of block field and boulder lag deposits developed subsequent to the high water phase of glacial Lake Barlow-Ojibway by wave and frost action. The block fields are characteristic of an extensive area of predominantly flat-lying well-bedded argillites of the Firstbrook Member, Gowanda Formation, and appear to extend southward towards the Montreal River. The visible cover of frost shattered blocks and boulders does not appear to be developed on the more massive units of the Gowanda Formation or other Precambrian rocks.

Entire sections of till cover have been removed from the rock hills, and knobs of the southwest upland with occasional remnants visible only in sheltered hollows on the southeastern flanks or on the tops of the higher hills above maximum water plane.

The major areas of peat are developed in the middle Wabi Valley and as back swamp deposits flanking both sides of the Blanche River. The major deposit at Maybrook, in Harley Township appears to have accumulated in what was initially a cut-off marsh section (back-swamp) which formed from the Lake Timiskaming by the advancing deltaic deposition of pro-Wabi Creek.

Entire sections of till cover have been removed from the rock hills, and knobs of the southwest upland with occasional remnants visible only in sheltered hollows on the southeastern flanks or on the tops of the higher hills above maximum water plane.

The major areas of peat are developed in the middle Wabi Valley and as back swamp deposits flanking both sides of the Blanche River. The major deposit at Maybrook, in Harley Township appears to have accumulated in what was initially a cut-off marsh section (back-swamp) which formed from the Lake Timiskaming by the advancing deltaic deposition of pro-Wabi Creek.

Entire sections of till cover have been removed from the rock hills, and knobs of the southwest upland with occasional remnants visible only in sheltered hollows on the southeastern flanks or on the tops of the higher hills above maximum water plane.

28. RECENT BEACH DEPOSITS (Unit 13): Sand and gravel beach deposits have been developed throughout the map-area during the multi-stage development and regression of glacial Lakes Barlow, Ojibway and Barlow. Storm beaches and bars are well developed on the moraine and till ridge materials along the central cuestas, where they have been worked on extensively for granular borrow. Such features are less prominently developed on the varved clays, but many fine examples of sand spits and wet beaches are nevertheless well represented in areas where bordering sand deposits have been removed by sheetwash and wave action.

29. BLOCK FIELD (FELSENMEER): Associated with the hummocky bedrock of Lundy Township is a thin veneer of block field and boulder lag deposits developed subsequent to the high water phase of glacial Lake Barlow-Ojibway by wave and frost action. The block fields are characteristic of an extensive area of predominantly flat-lying well-bedded argillites of the Firstbrook Member, Gowanda Formation, and appear to extend southward towards the Montreal River. The visible cover of frost shattered blocks and boulders does not appear to be developed on the more massive units of the Gowanda Formation or other Precambrian rocks.

Entire sections of till cover have been removed from the rock hills, and knobs of the southwest upland with occasional remnants visible only in sheltered hollows on the southeastern flanks or on the tops of the higher hills above maximum water plane.

The major areas of peat are developed in the middle Wabi Valley and as back swamp deposits flanking both sides of the Blanche River. The major deposit at Maybrook, in Harley Township appears to have accumulated in what was initially a cut-off marsh section (back-swamp) which formed from the Lake Timiskaming by the advancing deltaic deposition of pro-Wabi Creek.

Entire sections of till cover have been removed from the rock hills, and knobs of the southwest upland with occasional remnants visible only in sheltered hollows on the southeastern flanks or on the tops of the higher hills above maximum water plane.

The major areas of peat are developed in the middle Wabi Valley and as back swamp deposits flanking both sides of the Blanche River. The major deposit at Maybrook, in Harley Township appears to have accumulated in what was initially a cut-off marsh section (back-swamp) which formed from the Lake Timiskaming by the advancing deltaic deposition of pro-Wabi Creek.

Entire sections of till cover have been removed from the rock hills, and knobs of the southwest upland with occasional remnants visible only in sheltered hollows on the southeastern flanks or on the tops of the higher hills above maximum water plane.

30. RECENT BEACH DEPOSITS (Unit 13): Sand and gravel beach deposits have been developed throughout the map-area during the multi-stage development and regression of glacial Lakes Barlow, Ojibway and Barlow. Storm beaches and bars are well developed on the moraine and till ridge materials along the central cuestas, where they have been worked on extensively for granular borrow. Such features are less prominently developed on the varved clays, but many fine examples of sand spits and wet beaches are nevertheless well represented in areas where bordering sand deposits have been removed by sheetwash and wave action.

31. BLOCK FIELD (FELSENMEER): Associated with the hummocky bedrock of Lundy Township is a thin veneer of block field and boulder lag deposits developed subsequent to the high water phase of glacial Lake Barlow-Ojibway by wave and frost action. The block fields are characteristic of an extensive area of predominantly flat-lying well-bedded argillites of the Firstbrook Member, Gowanda Formation, and appear to extend southward towards the Montreal River. The visible cover of frost shattered blocks and boulders does not appear to be developed on the more massive units of the Gowanda Formation or other Precambrian rocks.

Entire sections of till cover have been removed from the rock hills, and knobs of the southwest upland with occasional remnants visible only in sheltered hollows on the southeastern flanks or on the tops of the higher hills above maximum water plane.

The major areas of peat are developed in the middle Wabi Valley and as back swamp deposits flanking both sides of the Blanche River. The major deposit at Maybrook, in Harley Township appears to have accumulated in what was initially a cut-off marsh section (back-swamp) which formed from the Lake Timiskaming by the advancing deltaic deposition of pro-Wabi Creek.

Entire sections of till cover have been removed from the rock hills, and knobs of the southwest upland with occasional remnants visible only in sheltered hollows on the southeastern flanks or on the tops of the higher hills above maximum water plane.

The major areas of peat are developed in the middle Wabi Valley and as back swamp deposits flanking both sides of the Blanche River. The major deposit at Maybrook, in Harley Township appears to have accumulated in what was initially a cut-off marsh section (back-swamp) which formed from the Lake Timiskaming by the advancing deltaic deposition of pro-Wabi Creek.

Entire sections of till cover have been removed from