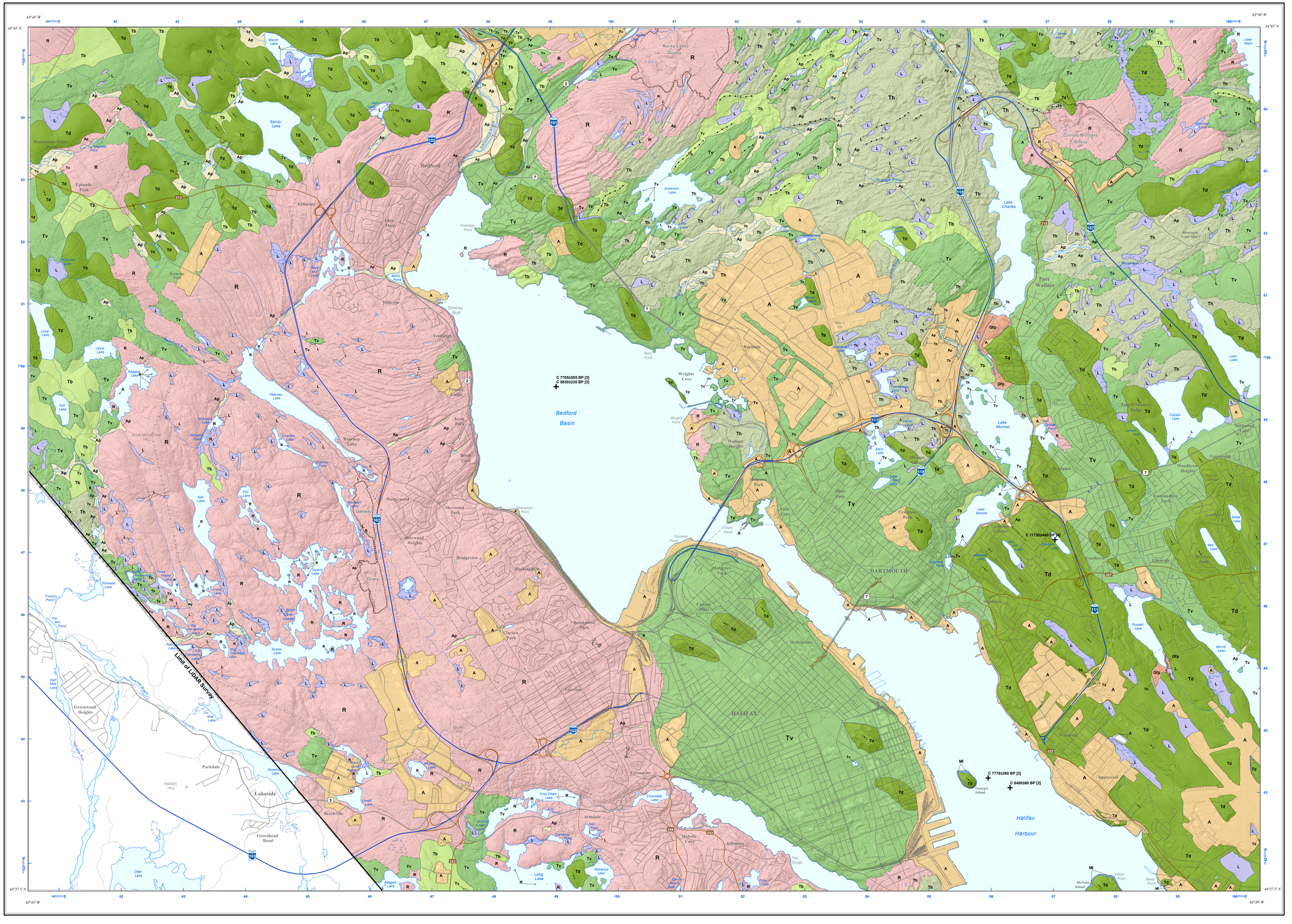


LEGEND

CENOZOIC

QUATERNARY

HOLOCENE (postglacial)

A — ***Anthropogenic***
Artificial or geological material that has been disrupted and redistributed by human activity; texture highly variable. Note that many areas of residential communities and till veneer are mapped as the original material because of the sporadic and shallow nature of the modification.

Ap — ***Alluvial***
Gravel, sand, silt, minor clay and organic deposits. Deposited by active streams and rivers in channels and floodplains. Thickness estimated from 1–10 m.

Ml — ***Marine littoral***
Boulders, cobbles, sand and organic deposits. Coarser material predominant where drumlins form headlands; finer material forms beaches, barrier bars and spits. Sediments deposited or reworked in the littoral zone (i.e. foreshore and backshore) by wave action, longshore drift and eolian processes. Thickness estimated from 1–5 m.

L — ***Lacustrine***
Sand, silt, clay and organic deposits. Sediments deposited from suspension in freshwater lakes, ponds and wetlands; includes shoreline material deposited or reworked by wave action. May be underlain by till or glaciolacustrine material (sand, silt and clay with some dropstones). Thickness estimated from 1–5 m.

PLEISTOCENE (last glaciation)

Gfp — ***Glaciofluvial outwash***
Gravel and sand deposits. Sediments deposited by proglacial meltwater forming outwash plains and terraces. Thickness estimated from 1–30 m.

Th — ***Hummocky till***
Beaver River Till is a diamicton with loose, sandy matrix and locally derived clasts. Surface topography is irregular with small mounds of till deposits. Sediments derived from subglacial erosion and meltout processes. These deposits may represent areas occupied by stagnant ice. Thickness estimated from 1–10 m.

Tb — ***Till blanket***
Beaver River Till is a diamicton with sandy matrix and locally derived clasts. Sediments deposited by ice and derived from subglacial erosion. Thickness estimated from 5–10 m (thick enough to mask irregularities of the underlying bedrock).

Tv — ***Till veneer***
Beaver River Till is a diamicton with sandy matrix and locally derived clasts. Sediments deposited by ice and derived from subglacial erosion. Thickness estimated from 0.5–5 m. Some areas include exposed bedrock and thicker till deposits (>5 m) of locally derived till.

Td — ***Drumlins***
Elongate landforms with long axes parallel to ice flow, composed of up to three tills: a core of Hartlen Till (observed only at coastal sections), overlain by Lawrencetown Till, and in some areas, overlain by Beaver River Till (described above). Hartlen Till is a diamicton with dark grey, compacted, clayey silt matrix, and predominantly locally derived and lesser distally derived clasts. Lawrencetown Till is a diamicton with brownish-red, compacted, clayey silt matrix, and predominantly distally derived clasts. Thicknesses of drumlins are affected by the surface relief of the landforms they are sitting on. In some instances depth to bedrock (determined from water well data, cf. Kennedy *et al.*, 2009) exceeds the surface relief, suggesting material filled a preglacial topographic low or paleovalley. These thicknesses may exceed 30 m.

PALEOZOIC

R — ***Bedrock***
Bedrock exposed at surface or beneath shallow soil. It may include minor fluvial, lacustrine and till deposits. Exposed surface is glacially scoured with ice movement features, such as striae, which are indicated by symbols where identified. Obvious 'strike ridges' seen on the LiDAR hillshade image represent more durable rocks within individual formations.

Symbols*

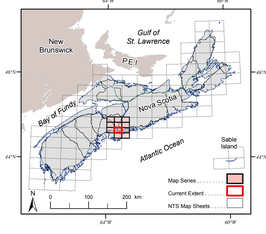
- Drumlin (ice flow direction inferred)
- Glacial striae (ice flow direction known, unknown, numbers represent relative ages where known, 1 being the oldest)
- Date location: years Before Present - BP; [reference]** Radiocarbon ^{14}C (C) — e.g. C 2900±150 BP [1]
- Esker (direction of flow known or assumed)
- Meltwater channel (direction of flow known or assumed)
- Moraine
- Geological boundary (defined, approximate)
- Large, active, aggregate quarry (Fisher and Prime, in preparation)
- Study area
- LiDAR survey area

- Rock in water
- Arterial highway — 102
- Trunk highway — 4
- Collector highway — 333
- Hard surface road
- Loose surface/resource access road
- Trail, footpath, cart track
- Railway (active, inactive)
- Coastline
- River, stream
- County boundary
- Transmission line (multi, single line)
- Swamp
- Lake, ocean

* Note: Compiled symbols list for map series. All symbols may not appear on each map.

**** References for Selected Radiocarbon Dates for Map Series**

[1] Boyd, R. and Honig, C. 1992: Estuarine sedimentation on the eastern shore of Nova Scotia; Journal of Sedimentary Petrology, v. 62:4, p. 569-583.
[2] Edgecombe, R.B., Scott, D.B. and Fader, G.B.J. 1999: New data from Halifax Harbour: paleoenvironment and a new Holocene sea-level curve for the inner Scotian Shelf; Canadian Journal of Earth Sciences, v. 36, p. 805-817.
[3] Miller, A.A.L., Mudie, P.J. and Scott, D.B. 1982: Holocene history of Bedford Basin, Nova Scota: foraminifera, dinoflagellate, and pollen records; Canadian Journal of Earth Sciences, v. 19, p. 2342-2367.
[4] Ogden, J.G., III. 1987: Vegetational and climatic history of Nova Scotia. I. Radiocarbon-dated pollen profiles from Halifax, Nova Scotia; Canadian Journal of Botany, v. 65, p. 1482-1490.
[5] Shaw, J., Taylor, R.B. and Forbes, D.L. 1993: Impact of the Holocene transgression on the Atlantic Coastline of Nova Scotia; Géographie Physique et Quaternaire, v. 47:2, p. 221-238.



Descriptive Text

This is 1 map in a series of 11 surficial geology maps at a scale of 1:25 000. This series is based on mapping at a scale of 1:10 000 using a LiDAR derived bare-earth hillshade model.

Drumlins (Td) are the dominant glacial deposit in the study area, and are primarily composed of Lawrencetown Till, although coastal exposures reveal that their cores are composed of older Hartlen Till (this till type was not found at surface so does not appear as a map unit (Stea and Brown, 1989)). In areas where surficial materials are thick, the interdrumlin area is composed of Lawrencetown Till. In areas where surficial materials are thin, the interdrumlin area is either a locally derived Beaver River Till (Tv, Tb or Th) or exposed bedrock (R). Till veneer (Tv) is a discontinuous cover of thin till which locally contains areas of exposed bedrock or thicker till deposits.

In coastal areas, where the foreshore was large enough to be mapped as an individual map unit, it is dominantly marine littoral deposits (Ml) derived from reworking of glacial deposits, or it is mapped as bedrock (R) or till (Td, Tv, Tb or Th). In protected bays, marine intertidal flats (Mf) have formed, the extent of which were mapped using 1:10 000 scale (ca. 2003) aerial photos. Low areas are infilled with postglacial alluvial (Ap) and lacustrine (L) deposits. Note that surficial units often are mapped into the ocean beyond the coastline to the extent of the available LiDAR data.

Some areas, for example the urban core of Halifax, are mapped as till veneer although much of the area has been reworked by numerous, local, human activities (anthropogenic modifications). In areas where enough material is altered it is mapped as anthropogenic deposits (A) (e.g. Burnside, Halifax waterfront).

Map Notes

Fieldwork and mapping were conducted from 2008-2010.

GIS databases, cartography and reproduction by Brian Fisher and Angie Ehler of the Nova Scotia Department of Natural Resources, Geoscience Information Services Section, 2009-2011. The GIS databases and map were developed using ArcGIS® 9.3.

Universal Transverse Mercator Projection (UTM), Zone 20, Central Meridian 63°00' West.

North American Datum (NAD) 1983 Canadian Spatial Reference System (CSRS) 98.

Base and digital data derived from the Nova Scotia Topographic Database (NSTDB), Copyright Her Majesty the Queen in Right of the Province of Nova Scotia. The NSTDB is available from Service Nova Scotia and Municipal Relations (SNSMR), Land Information Services Division (LIS), Nova Scotia Geomatics Centre (NSGC), Amherst, Nova Scotia.

Some discrepancies exist between the LiDAR and base data because of differences in the ages of the data sets and inaccuracies in the base data.

Shaded relief image derived from a 2 m LiDAR bare-earth Digital Elevation Model, collected by PHB Lasermap for Halifax Regional Municipality in April 2007. Azimuth of 315°, sun angle of 45° and a vertical exaggeration of 5.

Nova Scotia Department of Natural Resources
Mineral Resources Branch

Open File Map ME 2011-009

Surficial Geology Map, Part of the Halifax Claim Reference Sheet 11D/12D, Halifax County, Nova Scotia

D. J. Utting

Scale 1:25 000

1 0 1 2 km

Halifax, Nova Scotia
2011

Selected Bibliography

Fader, G. B. J. and Miller, R. O. 2008: Surficial geology, Halifax Harbour, Nova Scotia; Geological Survey of Canada, Bulletin 590, 163 p.

Finck, P. W., Graves, R. M. and Boner, F. J. 1992: Glacial geology of the South Mountain Batholith, western Nova Scotia; Nova Scotia Department of Natural Resources, Mines and Energy Branches, Map ME 1992-002, scale 1:250 000.

Fisher, B. E. and Prime, G. in preparation: Nova Scotia aggregate operations database; Nova Scotia Department of Natural Resources, Digital Product ME 414 (unpublished).

Kennedy, G. W., Garroway, K. G. and Fisher, B. E. 2009: Enhanced georeferenced version of the Nova Scotia Department of Environment's Nova Scotia well logs database (2008); Nova Scotia Department of Natural Resources, Digital Product ME 430, version 1.

Stea, R. R. and Brown, Y. 1989: Variation in drumlin orientation, form and stratigraphy relating to successive ice flows in southern and central Nova Scotia; Sedimentary Geology, v. 62, p. 223-240.

Stea, R. R., Conley, H. and Brown, Y. (compilers) 1992: Surficial geology of the Province of Nova Scotia; Nova Scotia Department of Natural Resources, Mines and Energy Branches, Map ME 1992-003, scale 1:500 000.

Stea, R. R. and Fowler, J. H. 1979: Pleistocene geology map of the Eastern Shore region, Halifax and Guysborough counties, Nova Scotia [sheet 3 of 3] [11D/14, 11D/15 and 11E/02 and parts of 11D/11 and 11E/03]; Nova Scotia Department of Mines, Map ME 1979-014, scale 1:100 000.

Stea, R. R. and Fowler, J. H. 1981: Pleistocene geology and till geochemistry of central Nova Scotia [Sheet 4]; Nova Scotia Department of Mines and Energy, Map ME 1981-001, scale 1:100 000.

Disclaimer

The information on this map may have come from a variety of government and nongovernment sources. The Nova Scotia Department of Natural Resources does not assume any liability for errors that may occur. This map is intended for use at the published scale of 1:25 000.

Acknowledgments

Access to the LiDAR data was provided by Halifax Regional Municipality. Summer students Teaka Brought, Fiona Gallacher, Jamar Regis and Geoff Reith provided field assistance. Thanks are extended to G. J. DeMont, P. W. Finck, G. Prime and C. E. White for critically reviewing the maps. The final maps do not necessarily imply agreement by the reviewers.

Recommended Citation

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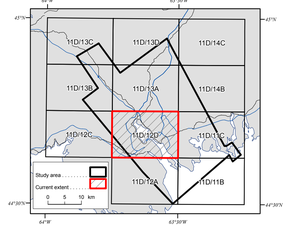

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