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Barnett, P.J., Yeung, K.H. and McCallum, J.D. 2012. Surficial geology of the Smoky Falls area southeast, northern Ontario; Ontario Geological Survey, Preliminary Map P.3755, scale 1:100 000.

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## Marginal Notes

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

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

Limited helicopter-supported field work combined with the examination of archival information (Riley and Boissonneau (unpublished field notes and photographs), Geological Survey of Canada, Operation Winsk (unpublished field notes, Skinner 1973, Sanford, Norris and Bostock 1968; Sanford and Norris 1975; and Thorleifson, Wyatt and Warman 1993, and their unpublished field notes) provided the ground control on the classification of objects.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

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

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

## REFERENCES

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

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

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

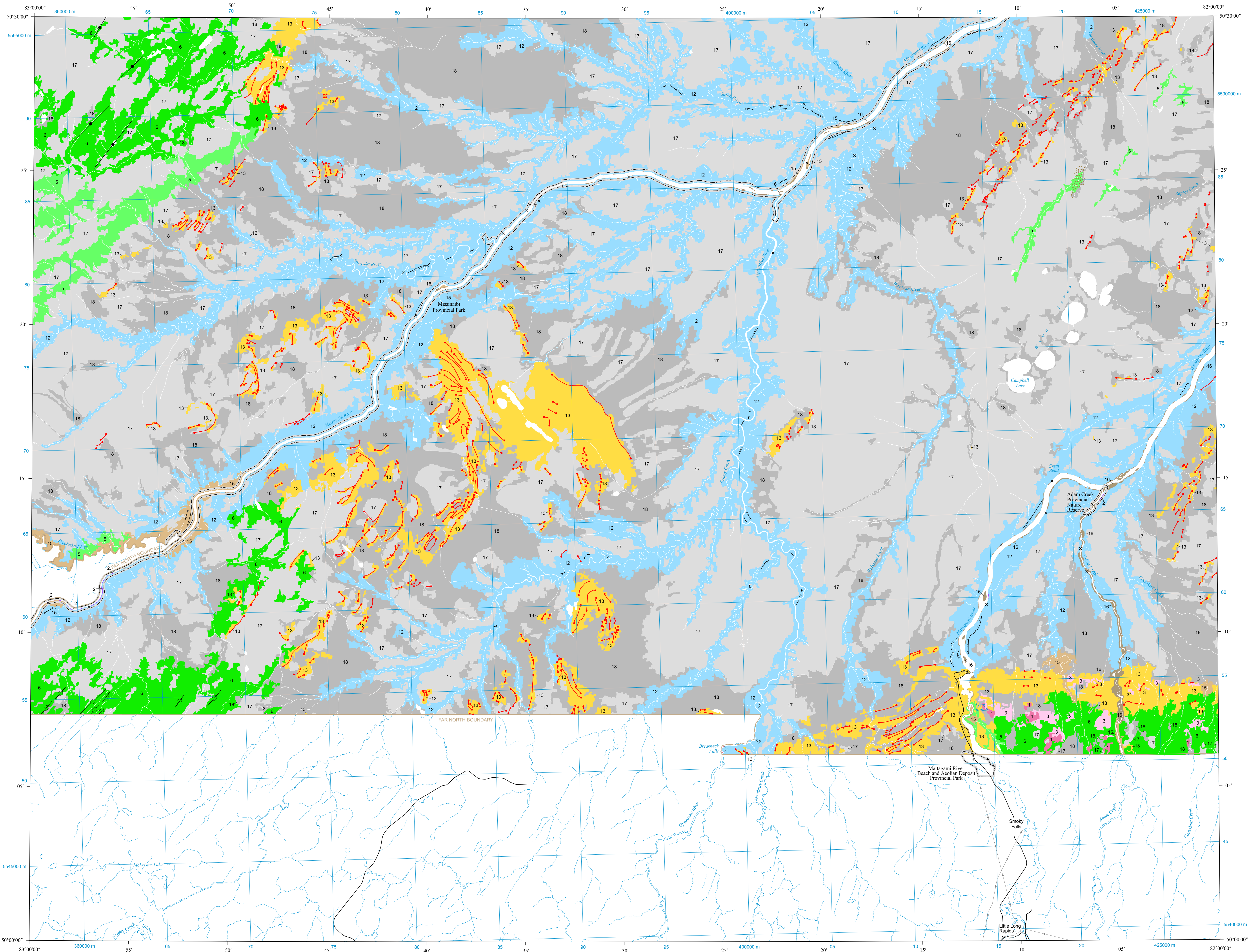
Riley, J. and Boissonneau, A. Unpublished field notes and photographs, Ontario Ministry of Natural Resources, Peterborough, Ontario.

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

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

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

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



## LEGEND\*

### PHANEROZOIC

#### CENOZOIC

##### QUATERNARY

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

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

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

- <sup>a</sup> The map legend applies to Preliminary Maps P.3625 to P.3758. Deposits on this sheet are mapped primarily where they reach 1 m or more in thickness. Thinner deposits are not generally shown. All legend units or deposit types may not be present on this map.
- <sup>b</sup> Refer to Ontario Ministry of Natural Resources Far North Land Cover 2005–2009 series of digital maps for better definition of wetland types and distribution.

## SOURCES OF INFORMATION

The digital base map is derived from the Ontario Land Information Warehouse, Land Information Ontario, Ontario Ministry of Natural Resources, scale 1:50 000, with modifications by staff of the Ministry of Northern Development and Mines. The digital base data is current to January 2011. The map co-ordinates are in UTM zone 17, North American Datum 1983 (NAD83).

Magnetic declination at the centre of the map area was approximately 10°31'W in 2012. Mean annual change is 1.1°E.

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

Guillet, G.R. 1964. Gypsum in Ontario, Ontario Department of Mines, Industrial Mineral Report no. 16, 126p.

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

Ontario Centre for Remote Sensing. Surficial geology, Smoky Falls area, Ontario; unpublished map, Ontario Ministry of Natural Resources, OGRS-423, scale 1:250 000.

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

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

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



Ontario Geological Survey

MAP P.3755

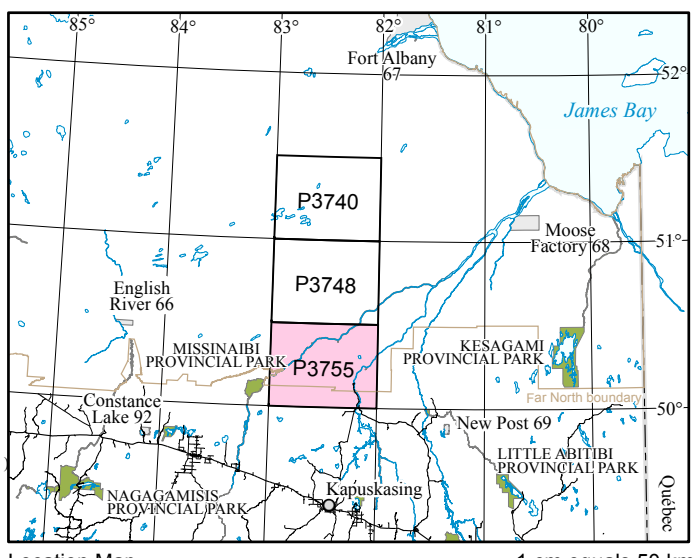
## SMOKY FALLS AREA SOUTHEAST, NORTHERN ONTARIO

Scale 1:100 000

NTS References: 42 J/1, 2, 7, 8

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## SYMBOLS\*

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

<sup>a</sup> The symbols list applies to Preliminary Maps P.3625 to P.3758. All symbols may not be present on this map.

<sup>b</sup> As presented on published and unpublished maps.

## CREDITS

Geology by P.J. Barnett, K.H. Yeung and J.D. McCallum, 2009.

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

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

Cartographic production by A. Evers.

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Issued 2012.

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