British Geological Survey — Natural Environment Research Council

Department of the Environment — www.doeni.gov.uk

Department of Enterprise, Trade and Investment — www.detini.gov.uk

COUNTY DOWN and BELFAST

Mineral Resource Map of Northern Ireland

Mineral Resources

Scale 1:100 000

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SAND AND GRAVEL

Superficial deposits

- Raised beach deposits
- Blown sand
- Glaciofluvial and glacial deposits

SANDSTONE

- Sandstone with potential for high specification aggregate
- Other sandstone

CONGLOMERATE

- Conglomerate

IGNEOUS AND META-IGNEOUS ROCKS

- Dolerites, lamprophyres, and their metamorphic equivalents (meta-dolerites and meta-gabbros) suitable for high specification aggregate
- Other igneous and meta-igneous rocks (basalts, andesites, rhyolites, granites,volcanic and meta-volcanic rocks)

META-SEDIMENTARY ROCKS

- Slate

LIMESTONE

- High purity limestone (>97% $CaCO_3$) - Ulster White Limestone

DOLOMITE

- Dolomite

LIGNITE

- Lignite (coincident with Lough Neagh Clay)

CLAY

- Lough Neagh Clay (coincident with lignite)
- Brick clay

MINERAL WORKINGS (as at 23.03.12)

- Leode (Sst) — Extent of valid (extant) planning permission (name, mineral commodity)
- *Corbet (Sst)* — Extent of expired planning permission (name, mineral commodity)
- Building stone quarries (including historical)

Mineral commodity

Cla	Clay and shale	Ign	Igneous/meta-igneous rocks
Lst	Limestone	San	Sand
Sag	Sand and gravel	Slt	Slate
Sst	Sandstone		

METALLIC MINERAL OCCURRENCES

- Au — Symbol indicates elemental occurrence

Symbol	Element	Symbol	Element
Ag	Silver	Ba	Barytes
Cu	Copper	Fe	Iron
Mn	Manganese	Mo	Molybdenum
Pb	Lead	Sn	Tin
Zn	Zinc		

ENVIRONMENTAL DESIGNATIONS (as at 23.03.12)

- International nature conservation designations (SACs, SPAs and RAMSAR sites)
- National nature conservation designations (ASSIs and NNRs)
- Area of Outstanding Natural Beauty: Mourne, Strangford and Lecale and Lagan Valley (part)
- \+ Scheduled Monument

MINERAL CONSTRAINT (as at 23.03.12)

- Area of Constraint on Mineral Developments

ADMINISTRATIVE AREAS

- Local Government District

WARNING: Please be aware that the printed colours may differ due to the settings of the plotter used.

MINERAL RESOURCES MAP OF NORTHERN IRELAND

A key aspect of sustainable development is the conservation and safeguarding of non-renewable resources, such as minerals, for future use. It is important to ensure that valuable mineral resources are not needlessly sterilised by the presence of insufficient supplies for future generations. The purpose of the maps in this series, therefore, is to show the broad distribution of those mineral resources which may be of current or potential economic interest. The maps are intended to assist strategic decision making in respect of mineral extraction and the protection of important mineral resources against sterilisation. They bring together a wide range of information, much of which is scattered and not always available in a convenient form. The maps are based on the digital compilation and interpretation of mineral resource data principally held by the Geological Survey of Northern Ireland.

The Geological Survey of Northern Ireland and counterpart The British Geological Survey have produced the maps via a commission from the Department of the Environment. This map, along with one for each of the five other counties (including the Belfast District), replaces the BGS Mineral Resource Map of Northern Ireland published in 1978 at 1:250 000 scale. The mineral resource data depicted on these maps are also available in a digital format for use within a Geographical Information System (GIS).

Mineral resources

Mineral resources are natural concentrations of minerals which might now, or in the foreseeable future, be of economic value. The assessment of mineral resources is, therefore, a dynamic process which must take into account a range of factors. These include geological reinterpretation as additional data becomes available, as well as the continually evolving demand for minerals, or specific qualities of minerals, due to changing economic, technical and environmental factors. Consequently, the economic potential of mineral resources is not static, but changes with time.

Generally, a mineral resource is known to exist within the boundaries outlined by geological mapping, which may be supplemented by geophysical and borehole data. Mineral resources are classified according to the degree of certainty as to mineral resource continuity. Inferred resources are those derived from available geological information and assumed but not verified geological continuity. They have neither been evaluated by drilling or other sampling methods, nor had their technical properties characterised, on any systematic basis.

Limitations

The mineral resource data presented are based on the best available information, but are not comprehensive and their quality is variable. The inferred boundaries shown are, therefore, approximate. Mineral resources defined on the map delineate the areas within which potentially workable minerals may occur. These areas are not of uniform potential and also may contain non-workable mineral deposits. For example, the map of sand and gravel resources shows the location of deposits of peat and glacial till, neither of which is shown on the main map. This overburden would need to be removed prior to the working of many of the bedrock resources depicted. Peat, as a mineral resource, is included on an inset map. Till is not considered to be a resource although it may contain small sand and gravel deposits. The economic potential of specific sites can only be proved by a detailed evaluation programme. Such an investigation is an essential precursor to submitting a planning application for mineral working. Even within areas of proven resource, there may be local constraints which affect isolated mineral workings may occur. The presence of these operations generally reflect very local or specific situations.

The locations of extant or expired planning permissions for the extraction of mineral are shown. These have been supplied by the Department of the Environment. Due to the complex and historic nature of planning permissions, some digital outlines are not available and, therefore, may not be shown on the map. In addition, building stone quarries are also shown. Information on the location of building stone quarries was taken from the Natural Stone Database of Northern Ireland, developed by the Consarc Design Group and Queens University Belfast, supplemented by information from GSNI. Due to the historic nature of building stone extraction, the boundaries of many of these quarries are poorly defined and, therefore, may not be shown on the map. While the compilers have tried to ensure that the site details are as accurate as possible, any map depicting the location of mines and quarries is a snapshot in time. Moving the extraction location as reserves become exhausted or a new extension starts production, and renaming of sites are regular occurrences, and in addition planning permission may cease to be extant.

The map is intended for general consideration of mineral issues and not as a source of detailed information on specific sites. The map should not be used to determine individual planning applications or in taking other decisions on the acquisition or use of a particular piece of land, although they may give useful background information which sets a specific proposal within context.

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CLAY

Brick clay

"Brick Clay" is a term used to describe clay and shale used predominantly in the manufacture of bricks and, to a lesser extent, roof tiles and clay pipes. These clays may sometimes be used in cement manufacture, as a source of constructional fill and for lining and sealing landfill sites. The suitability of the raw material depends principally upon its behaviour during shaping, drying and firing. This dictates the properties of the fired brick such as strength and frost resistance and, importantly architectural appearance.

Most facing bricks, engineering bricks and related clay-based building products are manufactured in large automated factories. These represent a high capital investment and are increasingly dependent, therefore, on raw materials with predictable and consistent firing characteristics in order to achieve high yields of saleable products. Blending different clays is sometimes necessary to achieve the desired properties and this practice is increasingly common feature of the brick industry. Continuity of supply of consistent raw materials is of paramount importance.

In County Down, Carboniferous-, Triassic- and Quaternary-age shales, mudstones and clays are suitable for brick manufacture.

Carboniferous-age shales and mudstones are one of the main sources of brick clays in Northern Ireland. In Co. Down, such clays and shales were formerly worked for brick manufacture in quarries on the shore of Strangford Lough.

Stone-free, red plastic clays from the Triassic-age Mercia Mudstone Group, with later re-deposition, have been worked for brick making in Belfast, and in the Hillsborough to Moira area (Lagan Valley). The Mercia Mudstone Group occurs around the town of Moira, in north Co. Down and the north-east part of Belfast.

Late glacial red marine clays are also exposed around Strangford Lough and sporadically along the east coast between Ballyquintin Point and Donaghadee.

Quaternary-age marine beach deposits, which comprise clay interbedded with sand and gravel, locally constitute suitable raw material for brick manufacture. These deposits occur along the coastal strip around Dundrum Bay and are perched upon glacial sands and gravels further inland.

Clays from the glacial till have been used for brick manufacture in north Co. Down.

Lough Neagh Clay

The Lough Neagh clays extend over 500 km², of which 300 km² underlie the lough. Clays are interbedded with up to 400 metres thickness of flat lying or shallow dipping sands, silts and lignite (see also text box on Lignite). Clays from the Lough Neagh Group were used in the manufacture of sanitary pipes at Coalisland, Co. Tyrone, and on the east side of Lough Neagh, near Portmore, Co. Antrim. South of Portmore, the Lough Neagh Group underlies superficial deposits to the north-west of the town of Moira in Co. Down.

The Lough Neagh clays are of a similar age and character to the ball clay deposits found in the south-west of England. The principal exploitable properties of these ball clays are their plasticity, dry strength, white-firing character and vitrification behaviour. Unfortunately, the high iron content of the clays around Lough Neagh limits their use and no resources have been identified that would be acceptable to modern ceramic producers.

CRUSHED ROCK AGGREGATES

Crushed rock aggregates are a key component of construction materials such as concrete and asphalt where aggregate adds low-cost reinforcement to these composite materials. Loose aggregates are also used as a stable foundation or road/rail base with predictable, uniform properties.

A wide variety of hard rocks are suitable for use as aggregates including igneous, sedimentary and their metamorphic equivalents (igneous or sedimentary rocks which have subsequently been altered by heat and/or pressure). Their technical suitability for different applications depends upon physical characteristics, such as crushing strength and resistance to impact and abrasion.

High specification aggregates (HSA) are needed to produce skid-resistant road surfacing. They must have a high resistance to both polishing by traffic and abrasion by studded tyres. Rocks such as fine- to medium-grained granites are used for specifications for resistance to abrasion, fragmentation and weathering, as well as compositional restrictions. For less demanding applications such as constructional fill and drainage media, a wider variety rocks with lower specifications are acceptable.

This text box describes resources of crushed rock aggregate in County Down derived from igneous rocks, sedimentary rocks such as sandstones, together with their metamorphic equivalents. There is currently no extraction of limestone for aggregate, an important source of crushed rock elsewhere in Northern Ireland, in Co. Down.

Igneous and meta-igneous rocks

Most igneous and igneous-derived rocks in Co. Down are suitable for general aggregate use. However, igneous rock resources suitable as HSA material for road surfacing applications are limited.

The basalt lavas and intrusions of the Antrim Lava Group have elevated PSV values that make them suitable for a wide range of applications. They are a major source of crushed rock aggregate elsewhere in Northern Ireland, and there are many extraction sites located on the north side of the Lagan Trough in south Co. Antrim. As a typically uniform, fine-grained, hard, dark rock it has many of the properties necessary for use in the road construction industry. A tract of the Lower Basalt Formation, of the Antrim Lava Group, occurs in Co. Down between Lisburn and Moira.

Sources of other igneous rocks suitable for use as general purpose aggregate are well distributed across Co. Down. The dolerite/gabbroic Scrabo Sill, near Newtownards, is suitable. Other sills are exposed at Ballyrainey and Dundonald. Dolerite from the Dundonald Sill has been worked in the past for building stone.

Sedimentary and meta-sedimentary rocks

The extensive quartz-rich sandstones (or gritstones) underlying much of Co. Down constitute a major source of HSA material. Twenty quarries are currently active, of which eight produce in excess of 100 000 tonnes per year, and several supply HSA to England. Average PSV values range from 57.8 to 66.0, with most quarries recording values in the interval 61-64.

In south Co. Down sandstones and siltstones, commonly with thick mudstone interbeds, generally produce inferior aggregate material, except in the vicinity of the Newry and Mourne granitic intrusive complexes where they have been thermally metamorphosed. In particular, a three kilometre-wide corridor of sandstones between the Newry and Mourne granite complex and Carlingford Lough has been extensively quarried. Sandstones are also suitable for aggregate use to the north. HSA aggregates are exploited at various sites in the vicinity of these granite complexes.

Successful trials have been undertaken on blasting (or expanding) the slate from Ballygranley Quarry (south of Bangor), for use as light weight aggregate. The slate occurs as interbeds within the Wallace's Rocks tract of the Gala Group gritstones.

SUPERFICIAL SAND AND GRAVEL

Sand and gravel are defined on the basis of particle size rather than composition. In current commercial practice, following the introduction of the European standards in 2004 (BS EN 12620), the term 'gravel' (or more correctly 'coarse aggregate') is used for material that is predominantly retained on a 4 mm sieve and 'sand' (or 'fine aggregate') is used for material that is finer than 4 mm, but coarser than 0.063 mm. For use in asphalt, 2 mm is the broad point between coarse and fine aggregate. Most sand and gravel is composed of particles that are durable and rich in silica (quartz, quartzite and flint).

The principal uses of sand are as a fine aggregate in concrete, mortar and asphalt, and the main use of gravel is as coarse aggregate in concrete. Substantial quantities of sand and gravel may also be used for constructional fill.

The variability of sand and gravel deposits, together with their possible concealment within or beneath till (boulder clay), means that it is difficult to infer their location and the likely extent of potentially workable resources.

Most workable deposits of sand and gravel formed at the end of the last ice age. They lie on top of the bedrock geology and are generally concentrated in the river valleys where they were deposited directly by ice at the margins of glaciers (glacial) or by meltwater flowing from the ice margin (glaciofluvial). Glacial, ice-contact deposits tend to be poorly-sorted and of inconsistent quality and thickness. Glaciofluvial deposits are generally well-sorted and more predictable in terms of quality and quantity.

County Down is a relatively small producer of sand and gravel in Northern Ireland, currently accounting for eight per cent of total output, with the major part of the sand and gravel reserves being located in deposits in the southernmost part of the county.

Glaciofluvial sand and gravel deposits

Glaciofluvial sand and gravel extraction is currently taking place on the coastal plain in the area of Kilkeel. Here the interstratified sands, gravels and cobble conglomerates overlie glacial till. Deposits are laterally continuous and texturally uniform. Similar deposits on the west side of Whits Water River and on the coastal plain on the south-east side of the Mourne Mountains, to the north and west of Annalong, have also been worked for sand and gravel.

To the west and north-west of the town of Moira, glaciofluvial sand and gravel deposits of limited extent have been worked. Extensive glaciofluvial sand and gravel deposits occur on either side of the Lagan Valley further east, in the area of Lisburn and south Belfast. Deposits also occur along the valleys of the Comber and Enler rivers and the coastal hinterland of south Belfast Lough.

Raised beach deposits

Raised beach deposits of sand and gravel occur around the northern side of Carlingford Lough west of Cranfield Point, to the east of Kilkeel around Dundrum Bay and on the north-west side of Killough Bay. Those raised beach deposits west of Cranfield extend well inland and are fronted on their seaward margin by blown sand. Gravel workings exploited raised beach deposits at the mouth of the Casey Water and to the east of Kilkeel.

Blown sand

Blown sand, which comprises fine- to medium- grained, subrounded to well-rounded quartz grains, results from aeolian reworking of beach, fluvial and glaciofluvial deposits. This type of sand is typically worked for mortar production, but might also be suitable for plastering and as moulding sand. Blown sand deposits occur on the north side of Carlingford Lough, west of Cranfield Point and around Dundrum Bay east of Dundrum where exploration has taken place at the Rathmullen sand pits. They also occur patchily along the north-east coast.

BUILDING STONES

A wide range of rock types are used as a source of building stone for masonry, field walling, roofing and flooring purposes, all of which have different requirements. The choice of building stone is governed by many factors, including the availability of a need for finer, more easily worked, stones for details such as mullions and sills on buildings. The suitability of particular rock types depends not only on aesthetic qualities such as colour and textural consistency but also factors such as strength and durability, as well as other commercial considerations.

A wide variety of hard rocks are suitable for use as building stone including igneous, sedimentary and their metamorphic equivalents (igneous or sedimentary rocks that have been altered by heat and/or pressure). Many rock types suitable for building stone are also suitable for crushed rock aggregate (see text box on Crushed Rock Aggregates). Some units, notably the thicker sandstone formations, lend themselves to being used as a freestone or dimension stone as they can be worked in any direction without splitting or failing. A continuing supply of building stone is important for new build and conservation work.

There are seven active quarries in County Down which are known to produce building stone. Of these, five work the greywacke gritstones of the Gala Group, while two, Cronagh and Largy, work the granites and granodiorites of the Newry Igneous Complex.

Igneous and meta-igneous rocks

The Newry Igneous Complex within County Down is actively exploited for building stone and crushed rock aggregate. The granodiorite is a bluish-grey granitic rock that makes an extremely hard and resistant building material. It has been used as facing stones on buildings and for kerbstones in Newry and Belfast.

Granite was quarried in the Mourne Mountains for many years and exported for use as paving stones in London and New York. The granite was also used locally for building purposes. Today, granite from the Mourne Mountains is used locally for paving streets, roadside kerb stones, millstones and in the construction of building copes, lintels, etc.). However, Mourne Granite can also create beautiful natural stone pieces and provide a range of products from hand crafted granite worktops, floor tiles, hard landscaping, memorials and other building products. It was used for the Millennium stone erected at Delamont Park and to make the base of the 9/11 memorial in New York.

The dolerite Dundonald Sill has been worked for building stone near Ballydrain.

Sedimentary and meta-sedimentary rocks

Scrabo Hill near Newtownards, which comprises Triassic-age Sherwood Sandstone intruded by dolerite and gabbro sills of the Scrabo Sill Complex, has been extensively worked for building and decorative stone since rail transport meant it could easily be sent to Belfast. Scrabo Stone', as it is known, is easily worked due to its high clay content. However, this has unfortunately meant that the stone performed poorly in the polluted marine atmosphere of 19th and 20th century Belfast.

Well bedded sandstones/gritstones, which underlie much of Co. Down, have been subjected to very low grade metamorphism making them good structural building stone and pavement blockstone, as well as high specification aggregate. These rocks have been extracted for dimension stone at several quarries. States were formerly extracted from interbedded mudstone units in these rocks. Carboniferous-age limestone has been extracted for building stone on the Ballycultra foreshore and Cretaceous-age Ulster White Limestone was worked for building stone at Clarehill.

LIMESTONE

Limestones are sedimentary rocks composed mainly of calcium carbonate ($CaCO_3$). Dolostones are limestones which also contain between 10-50 per cent magnesium carbonate ($MgCO_3$). As well as being relatively hard and durable, most limestones are relatively soft and easily worked when compared to other rock types. They are, therefore, one of the most commonly worked for construction aggregate and building stone. Limestones are also valued for their chemical properties in applications such as cement manufacture, glass making, iron ore smelting, flue gas desulphurisation, as a soil conditioner, food supplement and white filler. The strict chemical limits applied to material used in these applications restricts extraction to high purity stone (>97% $CaCO_3$).

County Down has relatively small limestone resources and currently there is no extraction of limestone.

Carboniferous-age limestones within Co. Down are represented by the small exposures at Cultra, Castle Espie and Carrigfoot, interbedded limestone and mudstone of the Castle Espie Limestone Formation was formerly worked for building stone and agricultural lime as well as clay and shale for brick manufacture. These quarries are now flooded and form part of a major wetland wild fowl reserve.

Permian-age 'Magnesian Limestone' or dolomite occurs at Cultra, on the south shore of Belfast Lough, where it is represented by nine metres of yellow coarse-grained dolomite. This unit is laterally extensive and occurs in outcrops and deep boreholes with recorded thicknesses up to 36 metres.

The Cretaceous-age Ulster White Limestone Formation, which is exposed around the margins of the Antrim Plateau, is an extremely pure, high purity chalk (>97% $CaCO_3$). It is worked in counties Antrim and Londonderry for the manufacture of cement, lime and agricultural lime. The only the southernmost extremity of the Antrim Plateau, along the Lagan Valley near Moira, lies within Co. Down. The thickest Ulster White Limestone Formation in this area has been worked for building stone and for production of agricultural lime.

GEOTHERMAL ENERGY

Geothermal energy is derived from naturally occurring heat from rocks at depth. Naturally heated groundwater can contribute to geothermal energy if it is of sufficient temperature and volume to be economically viable. Low temperature systems in Northern Ireland there are two provinces prospective for intermediate and deep geothermal energy. The first comprises the Permian to Triassic (Permo-Triassic) age sedimentary rocks deposited in the Rathlin, Lough Allen, Lame and Lough Neagh basins. These basins are also potential hosts for oil and gas (see text box on Hydrocarbons). The second is the Mourne Mountains, where geothermal potential exists in the deep, granitic, igneous rocks.

One borehole (Larne No. 2, in County Antrim) has been drilled in Northern Ireland with the specific aim of assessing geothermal potential. The temperature at the bottom of the borehole (2880 metres) was 87.8 degrees centigrade. Only one other borehole (Ballintoy, also in Co. Antrim) reached a depth of over 2500 metres (3983 metres), where the bottom-hole temperature was 97.8 degrees centigrade. These, along with temperatures encountered in numerous shallower boreholes and knowledge of the properties of rocks at depth, allow temperatures expected at 2500 and 5000 metres to be extrapolated.

Underlying a small area of north-west Co. Down is part of the Lough Neagh Basin. Here the Triassic-age Sherwood Sandstone Group at depth has the potential to act as a 'geothermal aquifer' with naturally heated groundwater accumulating in the pore spaces of the sedimentary rocks. Deeper sandstone aquifers are also prospective. Depending on the depth of an aquifer, the water may be hot enough for (i) district heating schemes, (ii) greenhouse heating, (iii) fish farming, (iv) bathing and, with additional heating, driving turbines). At 5000 metres deep, water encountered would be between 115-150 degrees centigrade (suitable for direct driving of turbines). In a geothermal aquifer, such water would be released by drilling boreholes into the hot rock formation. If this is a 'tight' sandstone with very low permeability, it would probably require some form of enhanced recovery technique to maximise the geothermal potential.

The dry and impermeable granitic rocks underlying the Mourne Mountains have the potential to be utilised as an 'Enhanced Geothermal System' (EGS). In an EGS, boreholes are drilled deep into the rock which is then fractured at depth. Cold water is then pumped down one borehole, where it is heated by the hot rock, before returning to the surface via the other. Water fractures before returning to the surface via collection boreholes. The returning water is hot enough to drive turbines and then be used for heating buildings. Once cooled, water is injected back into the ground to heat up again in a closed loop. A 3-5 megawatt EGS demonstration project is currently being developed at the Eden Project in Cornwall. Exploratory drilling for the UK's first commercial geothermal plant (10 megawatt) has begun at Redruth in Cornwall.

OIL AND GAS

- Permo-Triassic basin main target area
- Permo-Triassic basin marginal area

HYDROCARBONS

Conventional oil and gas

Exploration for oil and gas in Northern Ireland began in 1965 and whilst gas has been detected, it has yet to be discovered in commercial quantities. The hydrocarbon potential of most sedimentary rock 'basins' in Northern Ireland has yet to be fully tested and so these remain prospective for oil and gas.

The Lower Carboniferous-age rocks of southern County Tyrone and most of Co. Fermanagh form one of the two major provinces in Northern Ireland most prospective for oil and gas. The second prospective province comprises the younger Permian and Triassic (Permo-Triassic) age rocks beneath Lough Neagh and the Antrim Plateau.

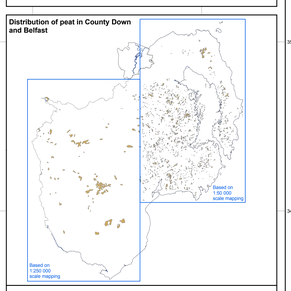
Underlying a small part of north-west Co. Down are sedimentary rocks deposited in the Lough Neagh Basin. This is the deepest, and possibly the most prospective, of the Permo-Triassic basins in Northern Ireland. An exploration borehole drilled in 1965 at Tullyhenan, near Ballynahinch, encountered 1 000 metres of Triassic-age Sherwood Sandstone Group. A minor gas was discovered at various intervals in the underlying Permian-age sandstones. Underlying Carboniferous-age coals and shales are the likely 'source' rocks for this oil and gas, although data from boreholes indicate that these rocks are missing (have been eroded) from some areas in the basin. The younger Triassic-age Sherwood Sandstone (which forms important reservoirs in the East Irish Sea gas field), along with Permian-age sandstones form potential 'reservoir' rocks into which oil and gas generated from the source rocks might migrate and become trapped. The overlying Triassic-age Mercia Mudstone Group is likely to provide a good 'seal' for any hydrocarbons trapped in the underlying sandstones.

Shale gas

Shale gas is extracted directly from mudrocks and shales which have previously been considered too impermeable (tight) to allow economic recovery of gas. Unlike conventional gas, which collects in porous reservoir rocks (such as sandstone) and can be released simply by drilling boreholes into those rock formations, shale gas is locked in the matrix of much less permeable mudrocks and shales. It can be accessed only by using a specialised drilling and production technique, called hydraulic fracturing or 'fracking', which enhances the limited natural micro-porosity to free the gas from the rock for extraction via a borehole.

In Co. Down, the Carboniferous-age organic rich shales underlying the Lough Neagh Basin may have potential for unconventional shale gas production. The distribution of shales at depths suitable for shale gas production is unknown, because few exploration wells have been drilled in these basins.

Distribution of peat in County Down and Belfast



PEAT

Peat is an unconsolidated deposit formed by decaying organic matter which accumulates in a water-saturated environment such as a bog or moss. Bogs occur in areas where they are dependent on rainfall for supply of water or in waterlogged hollows in the landscape. Blanket bog occurs where rainfall is sufficiently high and evaporation low enough for bog growth to be dominant. The two main types of bog are (i) raised bogs, characteristic of flat underlying topography and found on plains and broad valley floors and (ii) blanket bogs, which occur mainly in upland areas where conditions are suitably cool and wet.

Although most widespread in the west and north of Northern Ireland, blanket bog also occurs in eastern upland areas. Peat is rare in south-east Ulster, where it is found only in small areas in the Lagan Valley and on the Ards Peninsula in Co. Down. Raised bogs occur across Northern Ireland which may be infilling former lagoons or glacial lakes behind other coastal deposits or older glacial deposits respectively. Peat bogs in Northern Ireland, being generally smaller, were never developed on an industrial scale for power generation as they were in the Irish Midlands. Whilst peat is cut locally for fuel, its main usage is as a horticultural growing medium, although its potential as a carbon sink has been recognised.

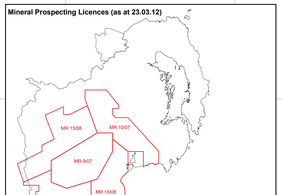
Whilst peat is widespread in County Down, it commonly occurs as small areas of limited extent. There are currently no extant planning permissions for the extraction of peat in the county.

LIGNITE

Lignite (brown coal) is a fossil fuel derived from dead plant material which has been transformed by burial and compression at elevated temperatures over a long period of time into combustible sedimentary rocks.

Lignite is present within the Lough Neagh Clay Group which underlies superficial deposits to the north-west of the town of Moira, in Co. Down. Lignite is also present in the Lough Neagh Clay Group on the east side of the lough, in Co. Antrim, but not below the lough. The lignite-bearing sediments form a belt that extends around the western, southern and eastern shores of Lough Neagh. Lignite beds are interbedded with up to 400 metres thickness of flat lying or shallow dipping sands, silts and clays within small fault-bounded basins (see text box on Clay). Individual beds of lignite are up to 43 metres thick. The lignite could be used to generate electricity from a thermal power station.

Mineral Prospecting Licences (as at 23.03.12)



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METALLIFEROUS MINERALS

The principal metal occurrences in County Down are historically important lead veins, frequently associated with zinc, copper and barytes, hosted within sedimentary rocks, which have significant potential for hosting gold mineralisation. Selected mineral occurrences to illustrate the diversity of metallic minerals in the county are shown on the map.

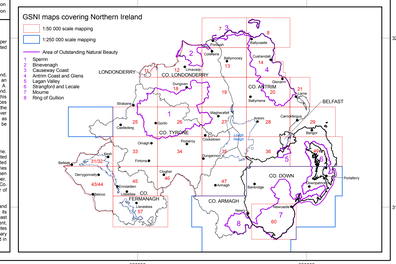
Precious metals (gold and silver)

Gold always occurs alloyed with silver and other elements and, as deposits of silver alone are not known in Northern Ireland, the two metals are discussed together. Sedimentary rocks underlie a significant proportion of Co. Down and represent an extension of the Southern Uplands Terrane of Scotland into Ireland (the Southern Uplands-Down-Longford Terrane). A number of significant gold occurrences occur in these rocks in Scotland and Co. Monaghan, in the Republic of Ireland. Additional bedrock gold occurrences are being evaluated in these rocks in Co. Armagh. By analogy the extension of this terrane into Co. Down, it is likely that bedrock gold mineralisation is present. Gold mineralisation is commonly associated with and dispersed in arsenic bearing minerals throughout Co. Down. Particular concentrations occur over the central part of the Newry Igneous Complex and surrounding the Mourne Mountains Granite Complex. Although alluvial gold is unlikely to ever become an economic source of gold in Northern Ireland, it does provide physical evidence of gold in bedrock. Insofar as alluvial gold is common in areas where vein-hosted gold is not presently known, the occurrence of gold in bedrock may be much more widespread.

Lead, zinc, copper, uranium, tin and barytes

Lead and zinc occurrences are scattered throughout the sedimentary rocks of the Southern Uplands-Down-Longford Terrane. Many of these occurrences, which are commonly associated with barytes, occur in veins. The Conlig-Whitespots Mines were worked along a vertical north-south-trending vein hosted by sandstones. The principal metals are lead, zinc and copper, associated with quartz, barytes and calcite. The Conlig-Whitespots Mines were worked intermittently during the 17th and 18th centuries and an estimated 13 500 tonnes of lead metal was recovered, with lesser amounts of copper and silver. Lead has been historically worked at two locations to the west of Strangford, at Castleward Mine and Tullyfaldy. Minor vein-hosted copper, lead, zinc and barytes occurrences are known in the Mourne Mountains and Newry Igneous Complex. Uranium occurs in Co. Down, commonly as a gangue mineral in metal-bearing veins. Barytes as a gangue in metalliferous veins is rarely ever of economic importance.

County Down has been the focus of a number of mineral exploration campaigns, originally focussed on base metals and uranium and subsequently on gold. Much of the exploration work has focussed on the Newry Igneous Complex and its immediate surroundings. Uneconomic copper-bearing mineralisation was identified in the Guiness Mountain area, south-east of Dromara. Geochemical exploration, whilst identifying encouraging areas of coincident gold and base metal enrichment, has not identified any zone of bedrock mineralisation. Stream-sediment geochemistry and radiometric surveying indicates anomalous uranium concentrations over both the Mourne Mountains and Newry Igneous complexes, although primary uranium-bearing mineralisation has not been identified. Tin occurs in quartz veins at Finlaghoca, south-west of Bryansford in the Mourne Mountains.

GSNI maps covering Northern Ireland

- 1:50 000 scale mapping
- 1:250 000 scale mapping
- Area of Outstanding Natural Beauty
  1. Sperrin
  2. Binevenagh
  3. Causeway Coast
  4. Antrim Coast and Glens
  5. Lagan Valley
  6. Strangford and Lecale
  7. Mourne
  8. Ring of Gullion