

# Antrim and Newtownabbey Preferred Options Paper - Minerals

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## **ANTRIM AND NEWTOWNABBAY DISTRICT COUNCIL DfE RESPONSE TO PREFERRED OPTIONS PAPER**

Please find the Department for the Economy's (DfE) response to the Antrim and Newtownabbey District Council, Preferred Options Paper in relation to Minerals. In addition we have included specific comments on groundwater. Attached is a DfE information paper on Mineral Development to inform all local councils as they develop their Preferred Options Papers. Minerals and Petroleum Branch and Geological Survey Northern Ireland colleagues would welcome an opportunity to meet with the council to discuss any issues that may arise from our response or offer any help that you may require.

### **Aggregates**

The Antrim and Newtownabbey DC area is located predominantly on the basaltic rocks of the Antrim Plateau. These rocks are a valuable source of high quality hard rock aggregate material widely used by the construction industry throughout Northern Ireland. Although several quarries have been worked in the past, the most recent information supplied to the Department for the Economy and held in the Geological Survey (GSNI) quarries database show two quarry operators active in the Antrim and Newtownabbey DC area. Additional hard rock aggregate resources may occur within small outcrops of intrusive igneous rocks within and the Cretaceous Ulster White Limestone in the council area but these are not currently being used.

The Mineral Planning Maps produced by the British Geological Survey and GSNI in 2012 indicate superficial glacial and alluvial deposits within the council area which could contain sand and gravel resources, but there are currently no operators working these deposits. Sand and gravel deposits within Lough Neagh are extracted and landed at several locations around the lough including Ballyginniff Wharf on the eastern shore. This is the only non hard rock aggregate operation in the DC area. Additional landing sites are located in neighbouring council areas close to Antrim and Newtownabbey which could easily act as sources of material for use within the council area. The Annual Quarry returns for the calendar years 2012-16 have been issued with a closing date of 31<sup>st</sup> March 2017.

### **High Value Minerals**

The district council currently has no areas under licence from the Department for the Economy for high value minerals vested in the Department. Historically Bann Valley (1989 – 1991) held licences for diatomite in the north west of the DC area, Glenshesk (1990) targeted zeolite minerals in the basalt and Antrim Perlite (1987 – 1997) targeted perlite at the Tardree Rhyolite. Despite extensive historic workings of the interbasaltic layer between the Upper and Lower Basalts of the Antrim Plateau for iron ore and bauxite, there is no indication of potential interest in the council area for metallic or industrial mineral exploitation in the immediate future.

## **Sustainability of Minerals**

Aggregates, industrial minerals and high value metallic minerals can, by their nature, only be extracted where they occur and, once used they are not renewed on a human timescale. The concept of sustainability for minerals is therefore different to many other types of development although the circular economy principles of reduce, reuse and recycle apply to the sustainable development of minerals.

In terms of the Sustainability Objectives the sustainable development of minerals within the council area can contribute positively to improving health and well-being and sustainable economic growth through the creation of jobs directly and indirectly related to quarrying. Quarrying operations within the ANDC area can have conflicting impacts on other sustainability objectives – for example, the quarry operations may have some local detrimental effects on air quality but this may be offset by reduced HGV movements that result from local production rather than importing aggregates from outside the council area. In many cases potential negative impacts from quarrying on sustainability objectives such as protecting the environment, landscape character and water resources can be the use of mitigation measures or proper consideration of these sustainability objectives in individual planning decisions.

## **Energy Minerals**

The Lough Neagh Basin is recognised as a potential economic source of lignite and historically BP and Antrim Coal have held licences for exploration and development. The current Lignite Policy Area includes the Crumlin deposit on the eastern shore of Lough Neagh, covering an area of 5.8 km<sup>2</sup> and containing reserves of over 250 million tonnes. It is highly unlikely that the lignite would be worked over the life of the Local Development Plan, given currently available extraction technologies and the need to reduce carbon emissions, but there is a case for safeguarding the resource to allow for consideration of its use with carbon capture and storage (CCS) technology in the future. The large-scale deployment of CCS alongside power generation is still restricted to handful of locations worldwide.

Hydrocarbons (oil and gas) are commonly regarded as ‘energy minerals’ for the purposes of planning and the potential for finding and producing these resources in the ANDC area should be considered. The council area contains parts of two sedimentary basins – the Lough Neagh and Larne Basins – beneath the thick basalt cover of the Antrim Lava Group. These basins share many of the geological features of the East Irish Sea Basin which contains the historically prolific Morecambe Bay gas field as well as a number of smaller oil and gas fields. Based on the results of exploration carried out in the Lough Neagh and Larne Basins and current knowledge of the geology, there is the possibility that these basins, and the ANDC area, could contain significant conventional oil or gas resources.

## **Sustainable ‘earth’ energy resources – geothermal energy**

There is considerable potential for the use of both shallow and deep geothermal energy resources for the production of heat, and possibly electrical power, within the ANDC area.

The earth is very hot at its core and the temperature decreases from the core to the earth's surface. In the earth's crust additional heat is produced from the decay of radioactive minerals within the crustal rocks. In volcanic areas of the world very hot temperatures are found at shallow depths of a few hundred metres, hot enough to produce electricity in countries such as Iceland, Italy and Indonesia. However, even in non-volcanic regions the rocks at a few kilometres depth may contain hot water that can be pumped to the surface and used to provide direct heating for district heat networks and, if hot enough, to generate electricity.

In the Lough Neagh and Larne sedimentary basins Permo-Triassic and possibly Carboniferous sandstones have sufficient water-filled pore space and are hot enough to form a viable deep geothermal resource for direct heating applications, in those areas where they are buried to depths of more than 1 kilometre. If these rocks are buried to depths of approaching 3km, temperatures of about 100°C might be expected which would be hot enough for electricity generation. Within the ANDC area the locations believed to have the greatest deep geothermal energy potential are around Antrim and to the northwest of Mallusk.

The ANDC area also has widespread potential for the use of shallow geothermal energy. The temperature of the ground is similar to the air temperature but, at shallow depths of only a few metres, the temperatures are relatively stable and not significantly affected by seasonal fluctuations in air temperature – at temperatures of about 12°C – 14°C the ground is hotter than winter and cooler than summer air temperatures. Ground source heat pump (GSHP) technology uses the ground's heat energy provide heating for domestic and non-domestic buildings via horizontal closed loop systems buried at depths of 1 – 2 metres or vertical systems installed in boreholes up to 100 metres deep. In some locations vertical open loop systems can circulate water through aquifer rocks at depths of a few hundred metres to produce either heating or cooling for buildings according to their seasonal needs. In the ANDC area this Aquifer Thermal Energy Storage could be deployed in the Sherwood Sandstone aquifer that is present beneath Newtownabbey and Mallusk.

### **Points of Detail on Preferred Options Paper**

- Gold and salt are not potential mineral resources within the ANDC council area (p 107)
- The Antrim Lava Group contains igneous basaltic rocks but not meta-igneous rocks (p 107)
- The iron-rich clay and ironstone probably do not have any mineral resource potential (p 107)

## **Antrim and Newtownabbey Council Supporting Evidence – Groundwater**

### **Introduction to Groundwater**

Groundwater is water that is underground in both the loose material above bedrock and in bedrock itself. Contrary to popular ideas, groundwater is not like surface water in that, typically, it is not found in underground streams and lakes. Groundwater fills the tiny void space between grains of material or in the cracks in the ground. The proportion of voids in the ground affects how much water can infiltrate down through the ground to form what are known as aquifers. The greater the proportion of voids, the larger and more productive the aquifer will be.

As an example, the Sherwood Sandstone Aquifer in the Lagan Valley contains 20 times more water than the Silent Valley reservoir can hold. Groundwater can range in age from being only a few hours old to a few thousand years old. The natural attenuation processes that go on in the ground serve to remove harmful chemicals and bacteria out of groundwater. The water itself dissolves out minerals in the ground so that it takes on similar chemical characteristics. Although groundwater quality is variable across Northern Ireland, in general, groundwater is naturally found in a condition that is suitable for drinking without the need for any treatment.

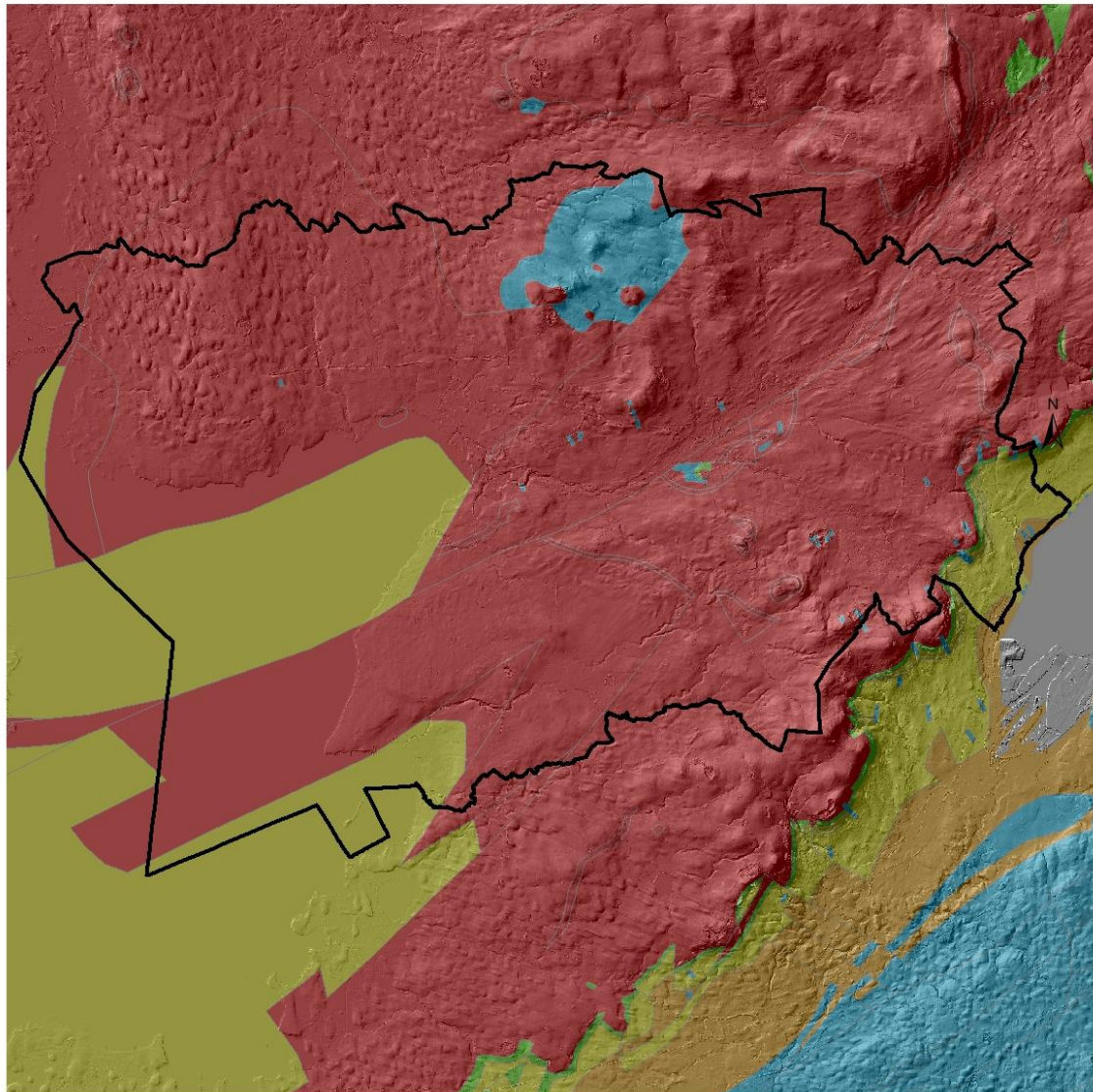
In regards to Local Development Plans, groundwater can be viewed as a natural resource that requires careful protection and as a water source that can be used for growth and economic development. It is important that both aspects are given consideration so as to look after the valuable resource and to use it sustainably to enhance and support future development needs.

### **General Groundwater Overview**

The Antrim and Newtownabbey Council area covers an area with a variety of groundwater conditions. Figure 1 shows the distribution of different aquifer classes.

The Sherwood Sandstone (Bh(I-f)) aquifer in the Lagan and Enler Valleys is shown as the orange band that runs from Moira up to Belfast and down to Newtownards. This is the most regionally important aquifer in Northern Ireland. The prospects for a reliable and significant water supply from this aquifer are high such that it has been used extensively for water supply for the last hundred years. A small area of this area is located within the south eastern portion of the council area. However, the Sherwood Sandstone Aquifer sub ducts beneath the Mercia Mudstone Group (Bp(f)) on the northern side of the Lagan Valley making it accessible for acquiring a reliable supply across a proportion of the Mercia Mudstone Group.

The red area on Figure 1, making up the majority of the council area, is underlain by Basalt rocks. Whilst not presenting prospects as good as the Sherwood Sandstone aquifer, the Basalts have been exploited successfully by small to medium sized businesses in recent years. Many of the larger business's operating around Mallusk abstract groundwater from the Basalts. Many farms in this area use groundwater pumped from boreholes for a range of agricultural activities. Groundwater is stored and transported through extensive networks of fractures throughout the basalts.











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0    2.75    5.5    11    16.5    22  
 Kilometers

**GSI** Geological  
 Survey of  
 Northern  
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**Figure 1 - Aquifer Classification across the Antrim and Newtownabbey Council Area**

	Antrim_and_Newtownabbey
Aquifer Class	
	Bh(f)
	Bh(f-k)
	Bh(l-f)
	Bm(f)
	Bl(f)
	Bp(f)

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The smaller areas of blue are underlain by rocks that present limited prospects for groundwater supplies. Some farms use groundwater pumped from boreholes as well as some isolated properties not served by mains water. Groundwater is stored and transported in discrete fractures making it difficult to drill a reliable borehole.

The area of mustard on Figure 1 shows areas of mudstone which do not present reliable prospects for a groundwater supply.

The thin strip of green along the flanks of the Belfast Hills is the outcrop of the Chalk, or Ulster White Limestone. Channels of groundwater can form within this rock as demonstrated by the density of springs that issue in a line along the base of the chalk. However, securing a reliable supply of water from the chalk can prove difficult with limited knowledge of any operating boreholes or adits abstracting groundwater from the chalk.

### **Current Status of Aquifers**

In general, the current evidence shows that all of the aquifers within the council area are in a healthy condition.

The basalts present the best prospects for groundwater supplies within the council area. There has been limited focused study on the basalts but anecdotal information suggests that they are capable of supporting medium scale supply demands, suitable for most forms of existing industry within the council area. The basalts are considered to be under utilised.

### **Groundwater and LDP**

The prospects for groundwater abstraction within the LCC area are reasonable. The combination of the access to both water and transport routes makes the council area an attractive place for business and industry. In particular the Basalts, as shown in Figure 1, are currently not being abstracted close to what could be sustained. The coincidence of land zoned for business and industrial use above the Sherwood Sandstone aquifer and Basalts would present an attractive prospect to businesses either seeking to expand, locate or relocate. Ensuring that such land remains available for groundwater abstraction is important to ensure the valuable groundwater resource is accessible.

There are a number of quarries that have been converted to landfill sites within the council area. These present a risk of contamination to groundwater in the Basalts. These are located close to Mallusk where the highest demand for reliable groundwater currently is. It is important that such landfills are properly regulated and managed to prevent the release of hazardous and non-hazardous substances in to groundwater, rendering the available groundwater resource non-potable.

### **Sustainable Use of Groundwater**

It is important that groundwater is used sustainably. Groundwater is recharged from rainfall infiltrating in to the ground. It is important that the rate of abstraction from an aquifer does not exceed the rate of recharge minus the ecological flow requirements of terrestrial water bodies such as rivers and lakes. If it does exceed it, groundwater levels will decline resulting in mining of groundwater.

It is possible to manage this using groundwater monitoring and modeling. Decisions on the capacity of the Sherwood Sandstone aquifer and the Basalts to sustain a level of abstraction should only be made following careful and extensive investigation, monitoring and modelling.

### **Groundwater Regulation**

Groundwater is regulated by the Northern Ireland Environment Agency (NIEA). All abstractions of groundwater over 20 cubic metres per day require an abstraction license from the NIEA to operate. The licensing system operates on a 'first come first served' basis. Therefore once an operator has a license, their investment is protected from others who may wish to use groundwater also.

Groundwater quality is also regulated by measures brought in by the EU Water Framework Directive. These include Nitrate Action Plans to regulate mainly diffuse pollution by land spreading. The Pollution Prevention Control regulations require businesses to operate a license for the appropriate and careful management of all substances used during production processes. The principle upon which these regulations operate are the prevention of any hazardous substance being released in to the environment and the limiting of the release of non-hazardous substances.