

# Belfast City Preferred Options Paper - Minerals

---

## Summary Comments on Preferred Options Paper

- There is very little detail provided in Section 8.6 Minerals beyond recognition of the contribution that minerals development can make to the local economy through the supply of raw materials and the provision of jobs, and the need for a sustainable approach which balances such development with the need to protect the environment. The attached Information Paper as well as the specific detail for Belfast below provides additional information about specific mineral resources within the BCC area to help inform the LDP.
- In Section 9.3.4 A Planning Strategy for Rural Northern Ireland the POP states that the main element currently in force relates to mineral development but does not acknowledge that planning policy on minerals has since been updated in the SPPS (but see below).
- In Appendix A: A review of regional Planning Policy Statements, the preferred approach to the Minerals Policies contained within the PSRNI is set out. In this table the provisions of the SPPS are generally followed, with a few exceptions.
  - In proposing to replace MIN1 Environmental Protection the justification given includes the consideration of the need for a Joint Mineral Plan with surrounding Council areas. Implicit in this is the recognition of the need for the local supply of aggregate materials for the construction industry – it is recommended that the proposal for a Joint Mineral Plan is included more prominently in the text to recognise the need for the local supply of bulk raw materials for future development within the Belfast City Council area. BCC may wish to consider reflecting this within the strategic aims at page 16 of the POP.
  - The proposal to replace MIN5 with policies specifying where mineral development would or would not be suitable appears to miss the aim of MIN5 which is to protect known mineral reserves from surface development that might prevent their future extraction. MIN5 has already been satisfactorily updated by the provisions in the SPPS. The existing MIN3, as updated by the SPPS, is the appropriate policy for delineating Areas of Mineral Constraint where mineral development would not generally be suitable.
  - In the table the relevant preferred option for the MIN policies is given as SCR8 but this policy option refers generally to enhancing environmental quality and avoiding materially harmful development rather than specifically to mineral development. In the case of mineral development the sustainable development approach must strike a balance between the economic benefits of mineral development and the need to protect the environment. The preferred option for minerals should reflect this balance.

- When the LDP is being developed the role of groundwater should be considered both as a water asset (Section 8.1.2) and for its role in flood risk mitigation through the application of SuDS (Section 8.4.4)
- The potential for shallow geothermal energy through the use of both open loop and closed loop ground source heat pump (GSHP) systems to reduce green house gas emissions (Section 8.4.1) and to increase the use of reliable low carbon sustainable energy resources to help meet heating and cooling needs within the BCC area (Section 8.4.2)

## Information on Mineral Development, Geothermal Energy & Groundwater for Belfast

### Aggregates

The Belfast City Council (BCC) area extends from the Belfast Hills in the west, across the River Lagan valley and estuary, to the Castlereagh and Holywood Hills in the east. This varied landscape closely reflects the geology that underlies it – basalts forming the Belfast hills and scarp slopes, Permo-Triassic mudstones and sandstones underlying the Lagan Valley, and older greywacke sandstones forming the Castlereagh and Holywood hills.

The BCC area is predominantly urban in character but both the basalts and the greywackes are potentially valuable sources of high quality hard rock aggregate material which is widely used by the construction industry throughout Northern Ireland. The Belfast Hills have a long history of quarrying and there are a number of active quarries, two of which, at Black Mountain and Hannahstown, are within the BCC area. The greywacke sandstone rocks are extensively quarried in County Down although there are no quarries within the BCC area and the nearest quarries are located in the Lisburn and Castlereagh, and Ards and North Down council areas. The Cretaceous Ulster White Limestone is quarried in the Larne district and it outcrops immediately below the basalts in the council area but it is unlikely to be extracted because of its location on the open slopes below the Belfast Hills.

The Mineral Planning Maps produced by the British Geological Survey and GSNI in 2012 indicate extensive superficial glacial and glaciofluvial deposits in the southern part of the BCC area which contain sand and gravel resources, including the distinctive reddish Malone Sands. These deposits largely underlie built-up areas and open spaces such as the Lagan Valley Regional Park where there is little potential for extraction. However, extraction and use of these valuable resources may be possible in some future development sites within the BCC areas. An example of this is the recent construction of two motorway service stations on the M1, just south of the BCC area, within these glaciofluvial deposits which involved the excavation of large volumes of sand which could be used on the sites and elsewhere.

Although some hard rock aggregates are quarried in the Belfast Hills the potential for future extraction will be limited by the need to protect this area for its leisure, scenic, landscape and environmental value. To meet its development needs the Belfast City Council area is, and will continue to be, a net consumer of construction materials sourced from outside the council area.

Some of these materials will be imported through the port but others will be transported by road from elsewhere in Northern Ireland.

**Given the significant plans for infrastructure development within the POP, we welcome the fact that Belfast CC intends to consider a joint Mineral Plan with neighbouring councils within the context of strategic planning for minerals to ensure supply from other Councils to meet Belfast CC demand. Belfast CC may wish to consider reflecting this within the strategic aims at page 16 of the POP.**

### High Value Minerals

The council currently has no areas under licence from the Department for the Economy for high value minerals vested in the Department. 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 Belfast City 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 minimised through the use of mitigation measures or proper consideration of these sustainability objectives in individual planning decisions.

### Energy Minerals

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 Belfast City Council area should be considered. The greywacke sandstones that form the Castlereagh and Holywood hills may be regarded as the basement rocks that form the southern boundary to the Larne sedimentary basin. The Permo-Triassic sandstones that outcrop in the Lagan Valley may, where buried deep enough, contain accumulations of oil or gas. The depths of these rocks increase towards the northwest and the potential for oil and gas fields to be present is greater in the neighbouring Antrim and Newtownabbey council area.

## Geothermal energy

There is potential for the use of shallow geothermal energy resources for heating and cooling purposes within the Belfast City Council area. 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 BCC area this Aquifer Thermal Energy Storage could be deployed in the Triassic Sherwood Sandstone aquifer that outcrops in the Lagan Valley area and dips to greater depths towards the west.

## Sustainability of energy resources

Geothermal energy, from both shallow and deep sources, is a reliable low carbon, sustainable energy resource which can play a role in the decarbonisation of the heat sector. Unlike other renewable energy resources such as wind, tidal or solar it is not subject to short term fluctuations – it is available 24/7 and 365 days a year. The other important property of shallow geothermal heat systems is that their heat output is 3 to 4 times the electricity input that the heat pumps use. The main thrust of government energy policy has been on the decarbonisation of electricity and GSHP systems can use electricity generated from renewable sources to meet heat demand whilst only producing very small carbon emissions. The efficiency of deep geothermal energy systems is much greater than shallow GSHP systems but the capital investment involved is also many times higher. **The BCC area has potential for the use of shallow and intermediate depth geothermal energy and the development of these resources could make a contribution towards the energy and climate change sustainability objectives.**

## 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.

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 Belfast City Council (BCC) area covers an area with a wide variety of groundwater conditions. Figure 1 shows the distribution of different aquifer classes.

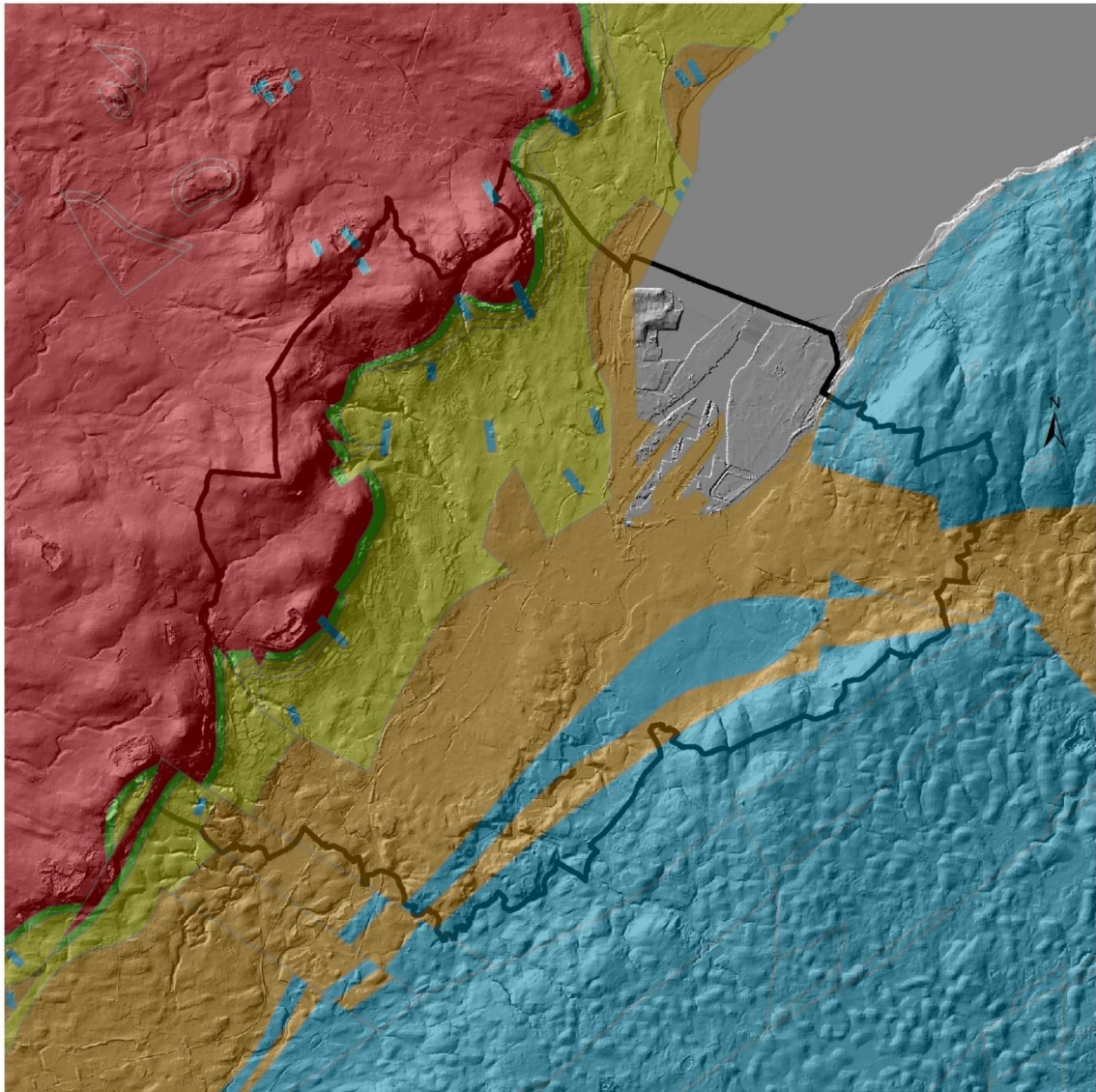
The Sherwood Sandstone (SST) aquifer in the Lagan and Enler Valleys is shown as the orange band that runs from Moira up to Belfast and down to Newtownards. This is the most regionally important aquifer in Northern Ireland. The prospects for a reliable and significant water supply from this aquifer are high such that it has been used extensively for water supply for the last hundred years. It was the availability of high quality water from the Sherwood Sandstone aquifer that made Belfast the largest exporter of carbonated water products in the world before the First World War.

The red area on Figure 1, to the north and west of the BCC area is underlain by Basalt rocks. Whilst not presenting prospects as good as the SST aquifer, the Basalts have been exploited successfully by low to medium sized businesses in recent years. 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.

The area of blue to the south and east of the BCC area is underlain by tight rocks commonly referred to as Greywacke. These present limited prospects for groundwater supplies. Some farms in this area use groundwater pumped from boreholes. 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. However, the Sherwood Sandstone Aquifer lies below the Mercia Mudstone Group 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 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.



0 1.25 2.5 5 7.5 10  
 Kilometers



**Figure 1 - Aquifer Classification across the Belfast City Council Area**

This map contains material that is based upon Crown Copyright and is reproduced with the permission of Land and Property Services under Delegated Authority from the Controller of Her Majesty's Stationary Office, © Crown Copyright and database right 2012. Permit number DMOU205.

## Current Status of Aquifers

In general, the current evidence shows that all of the aquifers within the BCC area are in a healthy state. The Sherwood Sandstone Aquifer (SST) is the most utilised, with much of the light to heavy industry that is based in the Lagan valley, located there to enable access to the SST aquifer via vertical boreholes. Historically, the aquifer has been supplying water for industry for over a hundred years. Initially the carbonated water industry made use of it and then it was used to drive steam engines to power heavy industry. Abstraction from the SST aquifer declined with the introduction of mains electricity but in the 1970's the Lagan Valley Aquifer project saw an array of boreholes across the aquifer supplying mains water, with little or no treatment requirements. Northern Ireland Water centralised production of water to Lough Neagh and stopped abstracting from the SST aquifer in 2008.

However, companies such as Coca Cola Hellenic Bottlers depend heavily on the water from the SST aquifer for their production. The Queen's University of Belfast is one of the largest current abstractors of groundwater in Belfast. Like Queen's, the hospitals within Belfast all operate water abstraction systems from the SST aquifer to supply their estates. There are still significant prospects available for new abstractions to take place from the SST aquifer. One area in particular is around East Belfast.

Groundwater is also used for the heating of buildings with the council area. The Lyric theatre and Royal Victoria Hospital use groundwater (since it has a stable temperature all year around) to strip heat from theatres and wards using a combined ground source heating and cooling system. This achieves the required space temperatures with 3 times less energy usage than other commonly used air conditioning and heating systems.

Due to the industrial heritage of Belfast, the SST aquifer may be impacted by the uncontrolled release of hazardous substances. There are known contaminated land sites within the BCC area, such as at the gasworks. However, it is unknown if such sites have significantly impacted the quality of the water stored within the SST aquifer. It may be that the complex sequence of unconsolidated materials that overlie the SST have acted to protect the SST from impact, with contamination isolated to within small sites within these sediments.

## Groundwater and LDP

The prospects for groundwater abstraction within the BCC area are significant. 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 Sherwood Sandstone Aquifer, as shown in Figure 1, has historically provided reliable water supplies for over a hundred years and the volumes currently being extracted are much less than those in the past when it was used extensively in the brewing, textiles and other industries. **Current groundwater level monitoring suggests that the aquifer is capable of sustaining the current demand and is likely to be capable of sustaining significantly more sustainable abstraction. The coincidence of land zoned for business and industrial use above the SST aquifer 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.**

## **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. On the other hand, high groundwater levels may contribute to flood risk so that properly regulated groundwater abstraction can help to mitigate this risk.

It is possible to manage this using groundwater monitoring and modelling. Decisions on the capacity of the Sherwood Sandstone aquifer 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 principles 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.

## **The role of the sub-surface in urban planning**

The importance of the ground beneath cities is under-recognised and often overlooked. For underground space to remain a societal asset there is a need to plan and manage its use. Consideration should be given to the challenges and opportunities presented by the sub-surface and planning for the use of the sub-surface should be incorporated into the Local Development Plan. Complex geology, particularly in an urban environment, poses engineering challenges and the underlying geology should be considered early in the planning process to make use of the opportunities that the sub-surface presents, and to avoid unexpected delays and increased costs.

## **Sustainable Drainage Systems (SuDS)**

The sub-surface is relevant to flood management through the use of Sustainable Drainage Systems (SuDS); by mimicking natural drainage systems SuDS can lower flow rates, increase water storage capacity and reduce the transport of pollution to the water environment. However care should be taken to understand the nature of the underlying geology in terms of its groundwater storage capacity and its susceptibility to ground stability hazards. Use of SuDS can improve water quality and enhance the amenity and biodiversity value of the environment.