Lisburn and Castlereagh 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 Lisburn and Castlereagh Council 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.

The red area on Figure 1, to the north of the LCC 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.

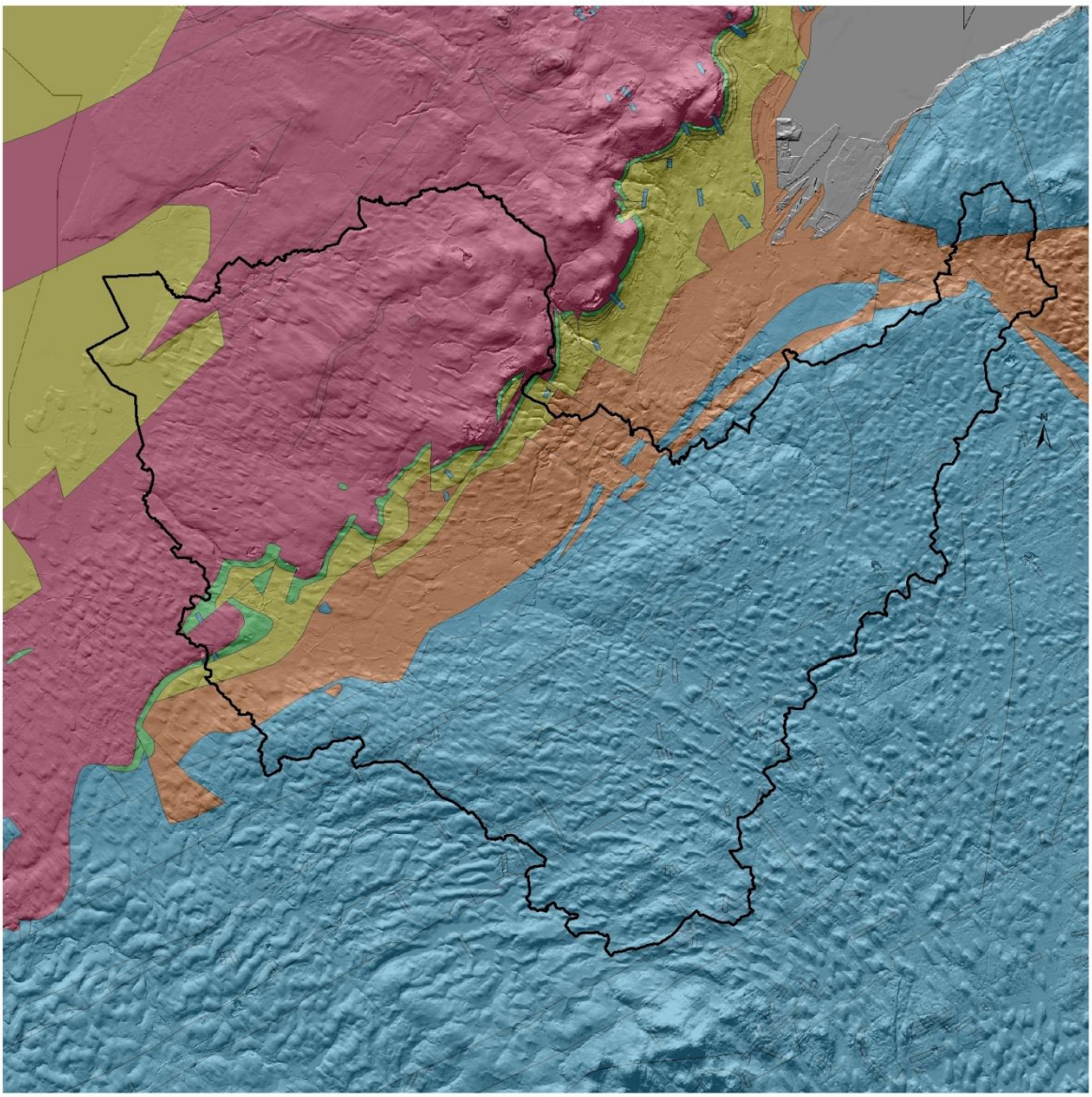

Figure 1 - Aquifer Classification across the Lisburn and Castlreagh Council Area

The area of blue to the south and east of the LCC 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 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. However, the Sherwood Sandstone Aquifer sub ducts beneath 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.

Current Status of Aquifers

In general, the current evidence shows that all of the aquifers within the LCC area are in a healthy conditions. The Sherwood Sandstone Aquifer (SST) is the most utilised, with much of the light to heavy industry that is based in the Lagan and Enler valleys, 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. Coca Cola have a network of boreholes around their site at Lambeg and their new facility at Knockmore from which they are currently abstracting over 1 million litres of water per day and hope to expand this to 2.5 million in the coming years. The siting of the new facility was significantly influenced by the reliability and accessibility of the SST aquifer.

There are still significant prospects available for new abstractions to take place from the SST aquifer. One area in particular is around Dundonald where the only abstraction is by the Ulster Hospital.

The basalts are also under utilised. In areas such as Glenavy, Ballinderry, Stoneyford and Dundrod, records show that only small scale abstractions are being operated by farms and small industry with the potential for more abstraction likely.

Groundwater and LDP

The prospects for groundwater abstraction within the LCC 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 is currently not being abstracted close to what it has been in the past. 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.

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 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.