DERBYSHIRE County Council
Improving life for local people

Guidance Notes: GROUNDWATER

If you are unsure about anything within these notes then please contact the Flood Risk Management (FRM) team using the details at the end of this document.

Derbyshire has a rich and diverse underlying geology (subsurface) ranging from freely draining aquifers to less permeable clayey material. These soil characteristics are a key factor in influencing groundwater conditions and ultimately assist in identifying areas susceptible to groundwater flooding. Fluctuations in the water beneath the ground result from the soils beneath the subsurface responding to natural factors. The level at which the groundwater sits is difficult to manage or influence.

Groundwater flooding

Groundwater flooding occurs when the water table (the water level below the ground surface) rises up and emerges above the ground surface. Periods of heavy and prolonged rainfall may cause the water level in the ground to fluctuate. During the wetter months of the year the water table is likely to be higher (i.e. closer to the surface).

Groundwater flooding can occur inside properties such as seepage into a basement (situated below the ground level), or by the emergence of groundwater at the surface which enters the property or causes damage to critical infrastructure.

Groundwater seepage

Identifying groundwater flooding

Groundwater flooding is often mistaken or misinterpreted as overland flow or surface water ponding at the surface as it is often difficult to tell the difference. This has resulted in the under reporting of groundwater flooding incidents and results in a misrepresented level of overall susceptibility of an area to groundwater flooding.

Although there is a strong correlation between the two sources they have distinctly different mechanisms. The mechanism of flooding from groundwater is illustrated in Figure 1 below.

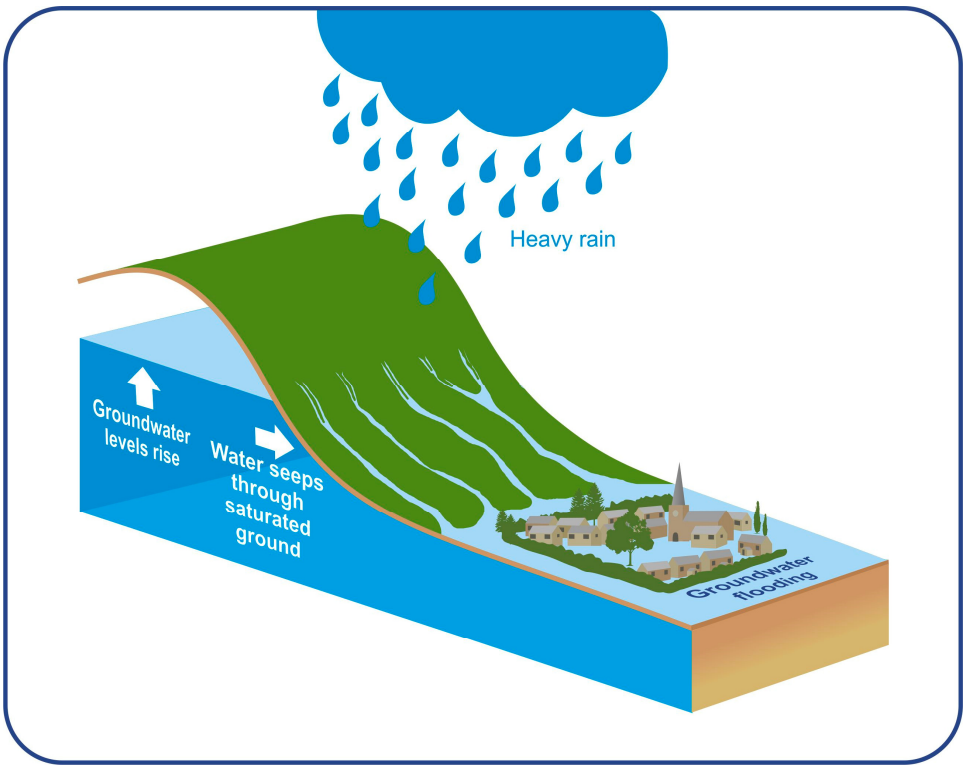

Figure 1: The mechanism for groundwater flooding

When flooding occurs, groundwater flooding can be identified by some/all of the following signs:

- Water bubbling up at the surface.
- Water seeping out of the ground/through basement walls.
- Flood water remains for a long period of time (days to weeks) after a storm.
- Flooding is seasonal, or during prolonged wet spells.
- Flooding does not occur after a very intense storm, but does during long periods of wet weather.

Predicting and monitoring groundwater flooding

Some areas are known to be more susceptible to groundwater flooding than others due to the naturally high level or seasonal variation of the water table. Groundwater usually becomes problematic when it materialises in the form of a natural spring, which can often discharge constantly throughout wetter periods of weather. Natural springs are common across parts of Derbyshire.

Landform changes, associated with urbanisation and mineral extraction operations, can substantially alter the characteristics of groundwater which makes predicting groundwater levels problematic. The wealth of natural

resources within Derbyshire has led to extensive mining operations with resultant large scale landform alterations.

In the absence of predictive modelling for groundwater, the monitoring and prediction of groundwater is usually undertaken by physical means, often using open boreholes. The water table is often the eventual destination of flood water, and if the water table is seasonally high then the longevity of the flooding can be particularly problematic.

It is widely accepted that the effects of climate change are likely to have an adverse effect on the occurrence, duration and severity of all sources of flooding. Consequently, the anticipated increased rainfall coupled with increased landform changes and urbanisation is likely to further complicate the monitoring and prediction of groundwater levels with further areas ultimately becoming susceptible to groundwater flooding.

British Geological Survey mapping

The County Council recognise the importance of understanding groundwater levels on a strategic level to steer development, aid the identification of priority flood risk areas.

The County Council use a licensed agreement to access British Geological Survey (BGS) datasets which provide national broad scale maps based on geological information. This information is used to assist in identifying areas with limited infiltration and average depth to ground water levels.

Options for helping to mitigate groundwater flooding

If you have experienced groundwater flooding you are advised to speak directly with your home insurer for further guidance. You should also let a member of Derbyshire's FRM team know.

The Environment Agency has produced a groundwater flooding leaflet which includes '**practical advice to help you reduce the impact of flooding from groundwater**'[1].

You may wish to consider the following list of actions to help you mitigate groundwater flooding:

- Prevent water from entering your property by installing external sealants, tanking materials on external basement walls or installing flood resilient air brick covers.

[1] http://www.groundwateruk.org/downloads/EAGWFlooding.pdf

- Consider replacing your floor with reinforced concrete that has a continuous damp proof membrane or create a raised concrete floor creating a void which will flood before the water rises into the house.
- Install a sump and pump below ground level. This would only have a limited impact and may not be effective in dealing with large volumes of groundwater. Diverting the water away from you property should be discussed with the Environment Agency or the County Council's FRM team.
- Install non-return valves on foul drainage to prevent any ingress problems should groundwater flooding occur.

Frequently asked questions

I think my property and or garden has been affected by groundwater flooding. Is there anything that the County Council can do?

If your property has been affected internally by groundwater flooding, please report this to the FRM team using the contact details below.

Unfortunately there is very limited support that can be provided by the FRM team if your property is affected by groundwater flooding, except for directing you to sources of advice and services. You are advised to contact your insurance company who should be able to guide you as to what you can do. For further information regarding insurance please refer to the **Insurance Guidance Notes**.

How do I stop groundwater flooding?

Groundwater flooding is a natural occurrence and unfortunately there is nothing that can feasibly be done to stop it, however you may be able to mitigate any impacts on your property. For further information please refer to the **Using Experts** and **Insurance Guidance Notes**.

The groundwater flooding has only just started occurring this year. It has never happened before?

Groundwater flooding can occur at any time, but it is often associated with a period of prolonged or heavy rain resulting in a high natural water table. Groundwater flooding may also occur due to changes in the local catchment, for example development, groundwater abstraction changes or geological movement all of which may cause shifts in groundwater level.

My neighbour hasn't been affected by groundwater flooding so why have I?

Groundwater emergence can occur when the water beneath the ground finds a 'weak' spot or fault in the earth surface. Therefore if your property has been affected then it is likely that the groundwater has seeped through a natural weak spot i.e. a naturally occurring permeable (allows fluids to move through it) rock or where a crack has appeared in impermeable rock. There could however be a number of reasons for why groundwater has affected just the one property and you are advised to speak to your insurance company who may be able to assist further.

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