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1 December 2016

Thérèse Coffey MP  
Parliamentary Under Secretary of State at the Department for Environment, Food and Rural  
Affairs  
Nobel House, 17 Smith Square  
London SW1P 3JR

Dear Ms Coffey

## Re: The Role of Groundwater in Flooding

Further to your recent appointment to Defra I would like to congratulate you on this significant appointment and wish you every success in your new role.

I am writing to raise some concerns regarding the role of groundwater in flooding in the UK because, as I explain below, groundwater represents a currently hidden and marginalised factor and the risks are not being assessed satisfactorily.

Floods are the most common and costly natural disasters we face in the UK. When it comes to the very significant decisions on planning and development that we face in this country, and the consequences of inappropriate development in flood risk areas, it is vital that we have a clear and accurate flood risk map to guide UK plc. Recognising that groundwater is a significant component of flooding, and ensuring that suitable maps and data are used to guide development, will improve risk management decisions and support the cost benefit analyses for expenditure on flood defences.

My firm has developed national models and maps showing in detail the risk to property and infrastructure from groundwater flooding (widely used in the property industry and elsewhere), and we have now undertaken preliminary analysis of the economic risk to property in England, using a new combined map of the risk from all sources derived from our own map and some published by the Environment Agency. The key points are:

- 1 Between 14% and 41% of the flood damage to property and infrastructure is due to groundwater (perhaps £200M/a to £870M/a with a central 'best current guess' of £500M).**
- 2 Flooding always looks like a surface problem. Even amongst the specialist flood community the role of groundwater in creating the conditions for flooding is not understood.**
- 3 About 1M properties are at risk from one or more of the main sources of flooding at 0.01 annual likelihood or greater (of which about 260,000 may be subject to the significant additional harm caused by groundwater flooding or groundwater driven longer duration surface water or river or sea flooding).**

- 4 Groundwater was defined by the Flood and Water Management Act 2010 as ‘Local Flooding’** and management of flood risks was assigned to the Lead Local Flood Authorities. I must advise you that **this is incorrect**. Groundwater plays a central role in the overall catchment flows, and it is not possible for these risks to be managed by authorities whose jurisdiction is limited to administrative rather than catchment boundaries. It is also my perspective that the current demarcation has prevented the achievement of a balanced overview of flood risk for the more permeable catchments of England (which include much of our most expensive real estate and critical infrastructure).
- 5 A similar degree of impact is anticipated with respect to infrastructure to that found with property. There is a particular need to consider these risks with respect to critical infrastructure, as was highlighted by the Climate Change Committee over recent years.**
- 6 Groundwater flooding is widely excluded from insurance policies (for mainly historical reasons), leaving the risk with property owners, contrary to the intentions of Flood Re.**
- 7 Significant consequential losses to the economy, businesses and communities occur due to long duration flooding associated with groundwater.**
- 8 The GeoSmart® national groundwater flood risk map completes the national mapping of flood risk in Britain to enable for the first time a map of flooding from all sources to be produced. An extract for part of the Thames valley (a preliminary version modelled by us on a 5m grid suitable for property and address level risk screening) is presented in Figure 1 below.**

It is of fundamental importance that an integrated flood risk map be available to guide planning and development decisions, and support strategic analysis. I understand that our new mapping provides the first national map showing the risk of flooding from all sources to property and infrastructure in England and it may be appropriate to make this or our next version widely available to meet the recent recommendations by the Environment, Food and Rural Affairs Committee report ‘Preventing Future Flooding’ to publish a ‘map showing risk of flooding from all sources’ as soon as possible. I will be pleased to discuss how our maps may be made available if this is of interest to the Government.

I would also like to stress that separate flood mechanism maps are useful but an overall integrated understanding is key. Groundwater has an influence on the other mechanisms and a greater awareness of groundwater will promote a catchment focus, which I understand may be aligned with Defra’s intentions for the 25 year Environment Plan. Figure 2 illustrates some of the main features of groundwater in relation to flooding to illustrate the important interactions.

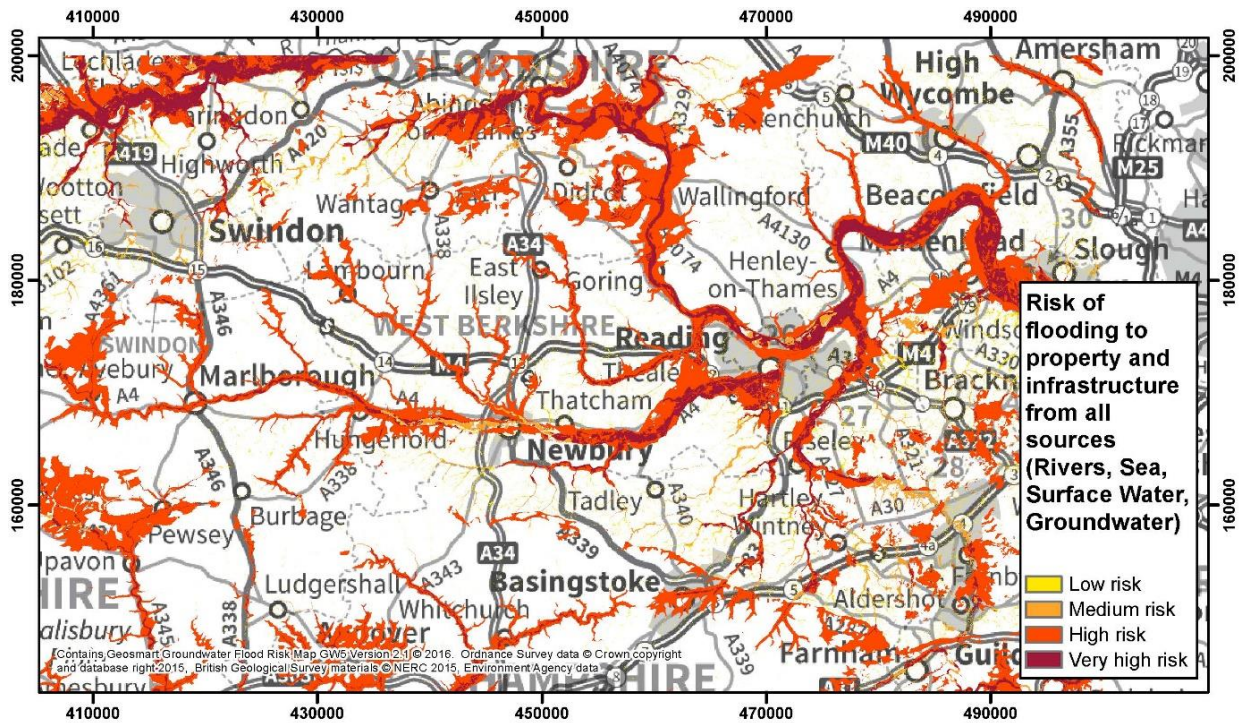


Figure 1. Extract of GeoSmart<sup>®</sup> Map of the Risk of Flooding from All Sources

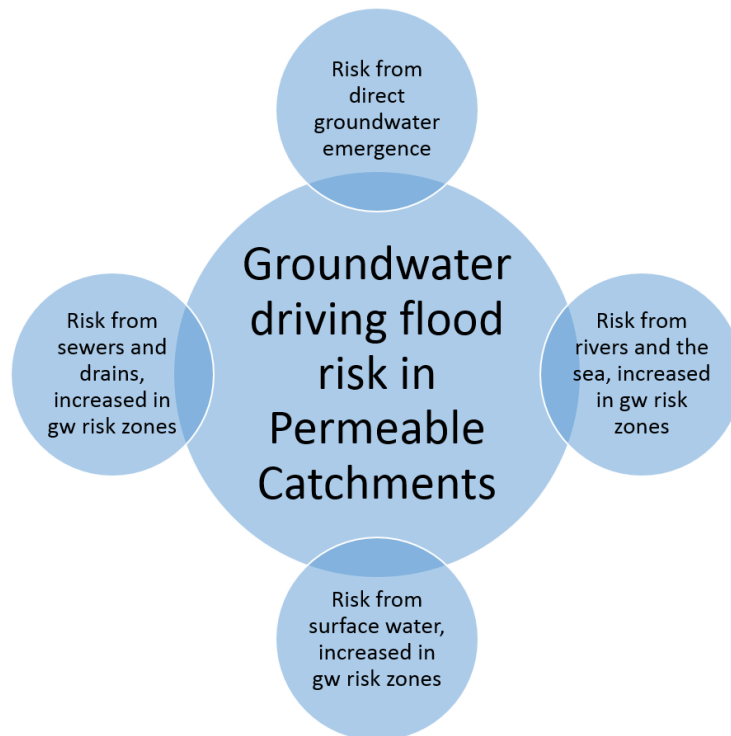


Figure 2. Key relationships between groundwater and flood mechanisms in permeable catchments

As a leading groundwater flood risk specialist, GeoSmart's specialist team has advised the Environment Agency, water companies, property industry, infrastructure organisations such as Network Rail and others on the management of flood risk, and we are currently supporting the Flood Forecasting Centre with a pilot implementation of our newly developed groundwater flood forecast service.

I recommend that the assessment of catchment flood risks considering all sources of flooding should be fully taken on by the Environment Agency, with appointment of groundwater scientists to their flood teams to enable a catchment perspective and also to report on the effect of long duration on flood economic risk as a further important parameter to consider alongside the current focus on velocities and depths of flooding. With such an approach I am confident that the currently very large uncertainties will rapidly be narrowed down, and a suitable national monitoring network established to help those managing the risks.

I will be pleased to provide further briefing on these matters to you and your department. Equally, to promote a wider discussion in the interests of assisting Defra and other relevant departments adopt appropriate strategies informed by a more detailed understanding of the characteristics of our more permeable catchments (which are more prevalent in England than other parts of the UK), I take the opportunity to copy my letter more widely including to those listed below to promote discussion. I will be pleased to offer a wider seminar on this topic to all interested parties, so please let me know if this will be of interest.

Yours sincerely



Mark Fermor  
Chairman

cc.

Daniel Johns, Head of Adaptation, Climate Change Committee

Mary Creagh, Chair, Environmental Audit Committee

John Curtin, Environment Agency