Groundwater Flooding
Groundwater flooding

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Groundwater flooding

- Definition:
  
  "A groundwater flood event results from a rise in groundwater level sufficient for the water table to intersect the ground surface and inundate low lying areas"

- Groundwater flooding (also commonly referred to as “clear water flooding”) has been defined as the type of flooding that can be identified as being caused by water originating from beneath the ground surface from permeable strata through a natural process (rather than through anthropogenic activities such as leakage from pipes and seepage into ground excavations).
Groundwater flooding

- Groundwater flooding can also be differentiated from surface water flooding by its persistence, with a typical duration that is measured in weeks rather than hours and days and has a tendency to occur throughout the winter, often extending into spring and sometimes into the early summer.
Groundwater flooding

Frequency of Occurrence
Applying standard statistical techniques used in fluvial flood estimation, to estimate the return period of groundwater level peaks is difficult. The techniques require independent peaks. Groundwater peaks are closely related to the summer minima which, in turn, are related to the previous peak. This dependence or memory can extend back many years in some aquifers. Selecting independent peaks reduces the total number of peaks considerably and therefore the level of confidence that can be placed on the results. It is therefore only possible to state the number of occurrences of high groundwater levels or groundwater flooding in this study rather than formal frequency analyses.
Causes of Groundwater Flooding

Groundwater flooding is caused by the association of a number of factors which are:

- Geological conditions;
- Presence of dry valley, winterbournes, spring lines, fault lines;
- Presence of properties located adjacent to dry valleys;
- “16 weeks of heavy rainfall” – defined as a total of 400 mm in Wiltshire.
Impact of Groundwater Flooding

There are a number of physical, economic and social impacts that result from groundwater flooding events some of which are common to fluvial flooding and others unique to groundwater flooding.
Impact of Groundwater Flooding

- **Long Duration of Flooding**
  During groundwater flooding events, property, land, roads and services are “under water” for long periods of time with significant physical, economic and social consequences that are described below. Compared to fluvial events where floodwater dissipates in a few hours or at the most a day or two, groundwater flooding can be present for periods of up to many months.
Impact of Groundwater Flooding

- **Physical Impacts**
  The damage to property is of a different type to that normally associated with fluvial flooding. In groundwater flooding events the water usually emerges relatively slowly so that the force and the velocity of the floodwater can be much less than occurs at times of fluvial flooding. However the majority of the flow is not contained in a restricted channel or floodplain as it generally occurs where there is no established drainage path and only shallow gradients.
Impact of Groundwater Flooding

- Agricultural Land

In agricultural areas the occurrence of groundwater flooding does not usually have a significant impact upon the farming community but in the 2000-01 event water levels were very high over a long period causing a more pronounced impact than usual. In the Yorkshire Wolds there were incidents of large-scale market gardening enterprises being affected that employed several hundred staff and suffered extensive damage and loss of income. It should be noted that this is believed to have arisen from poorly designed boreholes becoming artesian and flooding the local area.
Impact of Groundwater Flooding

- **Social Impacts**
  With the long duration of groundwater flooding houses can become uninhabitable for long periods of time without such ground-floor facilities as kitchen, toilets, power and heating. Roads can be closed for several weeks, which prevent people from leaving their properties. Workplaces, shops, and schools may become inaccessible thereby affecting the normal way of life and means of employment.
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