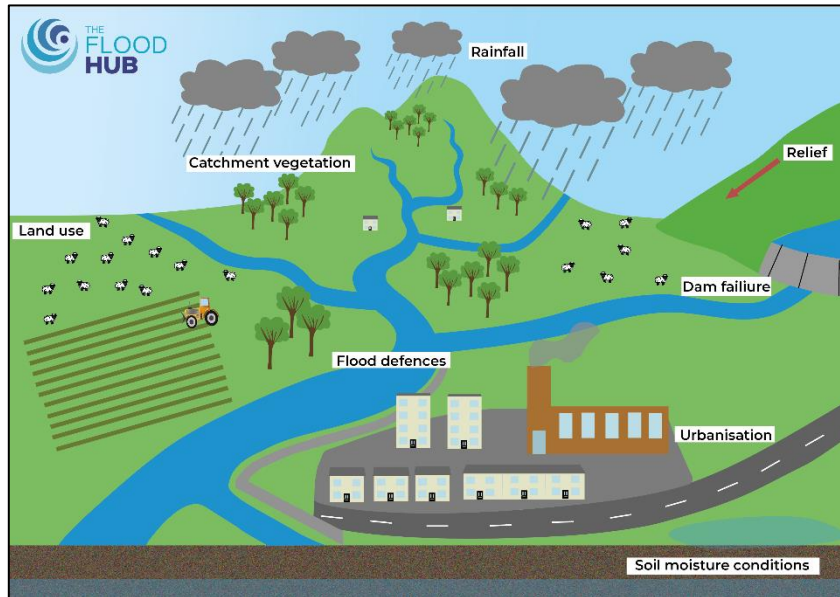


Low Crosby Flood Management

Factors contributing to the flood risk

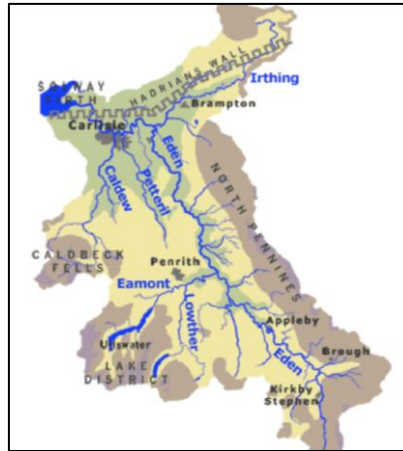
- There are several physical and human factors contributing to the risk of flooding.



- Using two separate colours, ring the physical and human factors contributing to the risk of flooding. Add a key to explain the colours you have used.
- Using the diagram, suggest factors likely to increase the flood risk and those likely to decrease the flood risk. For each, explain why it will increase or decrease the flood risk.

Factors likely to increase flood risk	Factors likely to decrease flood risk

2. The map below shows the catchment of the River Eden. The catchment has a high drainage density (sum of channel lengths per unit area), with a considerable total length of rivers.

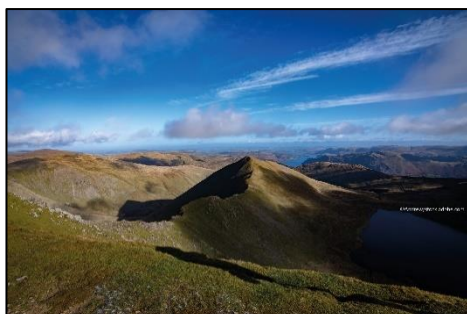


Source: [River Eden](#)

- (a) Locate and label a tributary.
- (b) Locate and label a confluence between two rivers.
- (c) Where is the mouth of the River Eden? _____
- (d) Suggest why a high drainage density increases the risk of flooding.

- (e) Using evidence from the map, explain why Carlisle is particularly vulnerable to flooding.

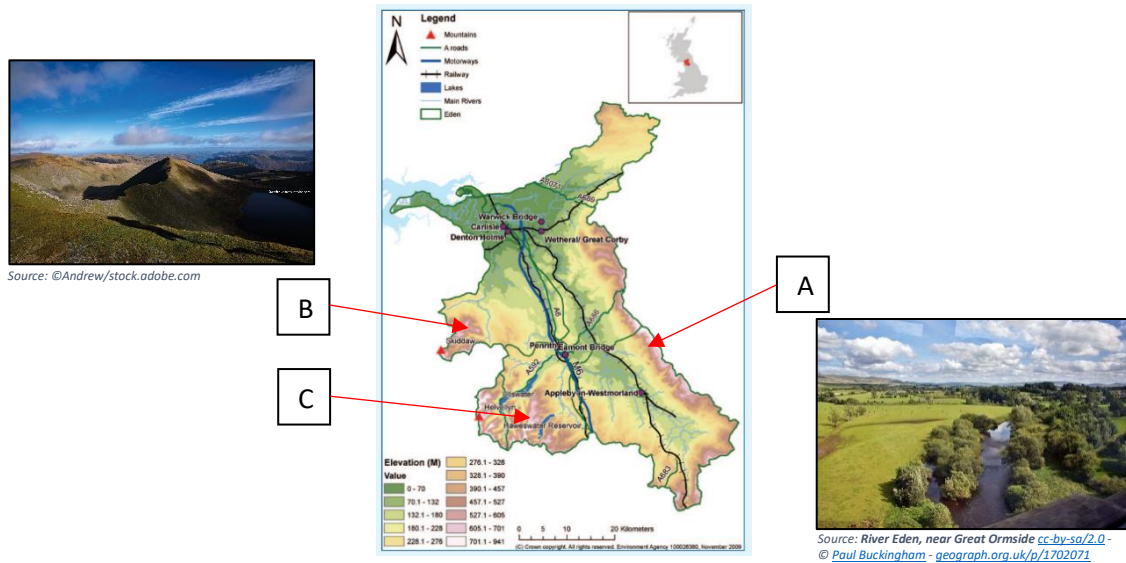
3. Explain how the geology of the Eden catchment contributes to the risk of flooding.



Tough, impermeable rocks underly much of the Eden catchment

Source: ©Andrew/stock.adobe.com

4. Relief – the ups and downs of the landscape – is an important factor affecting flood risk. The map below shows the relief of the Eden catchment. Notice that there is high ground at the edges of the catchment. The main river flows over a relatively low-lying and flat landscape.



(a) Look back to the map showing the Eden catchment (Activity 2). What are the names of the upland areas shown A, B and C?

A _____

B _____

C _____

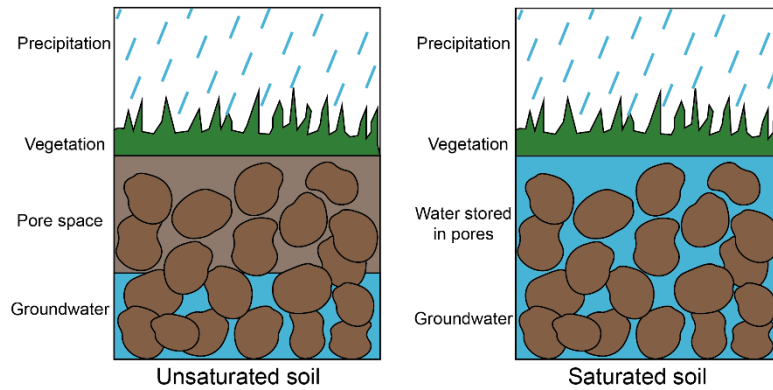
(b) The photo below shows the landscape of the Lake District, in the SW edge of the catchment.



Source: ©Andrew/stock.adobe.com

Suggest how this landscape increases the risk of flooding further downstream.

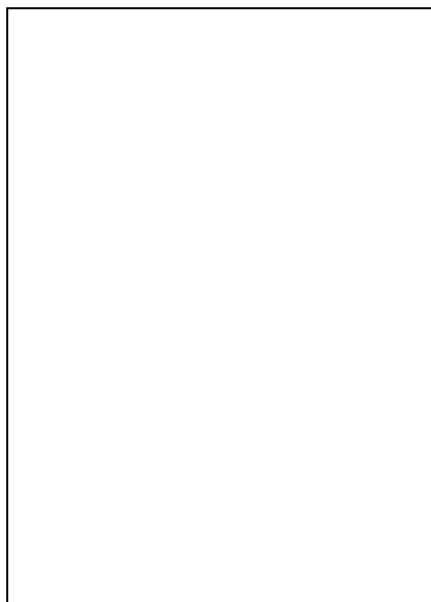
5. One of the main reasons for the extreme flooding in 2015 was that soils were already saturated following a long period of wet weather. Soils act like a sponge, absorbing and storing water.



- (a) Describe how water can be stored within the soil following a rainfall event.

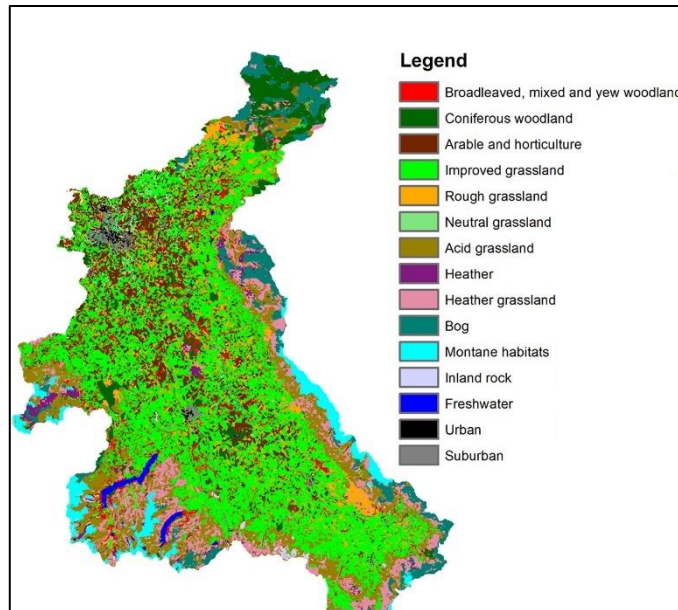
- (b) How does this reduce the risk of flooding?

- (c) Draw a labelled diagram to show what happens when further rain falls on saturated soil.



- (d) Explain how this increases the flood risk.

6. Land use is one of the most important human contributory factors. The map below shows the land use in the Eden catchment.



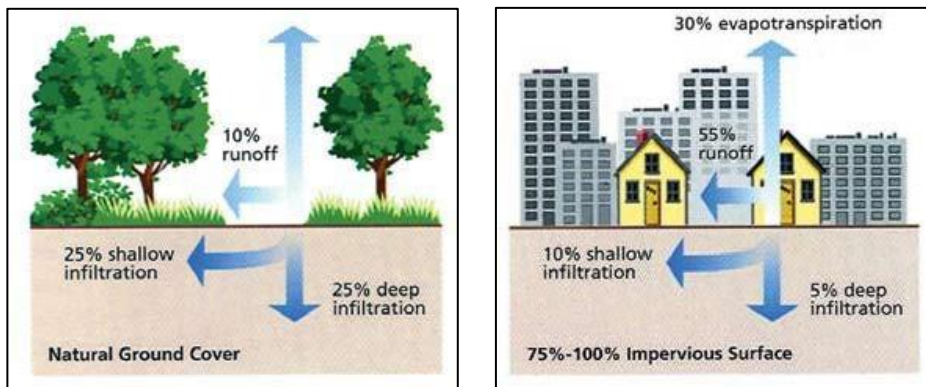
Source: <https://onlinelibrary.wiley.com/doi/full/10.1111/jfr3.12803>
 land cover (CEH Land Cover Map 2007, Morton et al., 2011) in Reaney, S.M. (2022). Spatial targeting of nature-based solutions for flood risk management within river catchments. *Journal of Flood Risk Management*. 15. 3. p.e12803.

- (a) What is the dominant land use in the Eden catchment? _____
 (b) Is this likely to increase or decrease the risk of flooding? Explain your answer.

- (c) A common but fragmented type of vegetation is 'Broadleaved, mixed and yew woodland'. How does woodland help to reduce the flood risk?

- (d) The dominant land use in the uplands is 'montane habitats' Use internet research to discover the characteristics of this type of vegetation. [Include 'UK' in your search.] Include a labelled photo.

7. Most of the Eden's catchment is rural. The only sizeable urban area (shown as 'Suburban' in Activity 6) is Carlisle. Yet, urbanisation can be a significant factor contributing to flood risk. The diagrams below contrast a rural area with an urban area.



Source: <http://www.opengreenspace.com/wp-content/uploads/2010/12/surface-runoff.jpg>

FISRWG, 1998

- (a) Calculate the percentage of evapotranspiration in the rural area. Write a label to show this on the diagram.
 (b) Calculate the percentage increase of runoff in an urban area compared with a rural area.

- (c) Suggest why infiltration is higher in rural areas.

- (d) Suggest why runoff is higher in urban areas?

- (e) Explain why urbanisation increases the risk of flooding?

- (f) Using internet research, find out what can be done to reduce the risk of flooding in urban areas?

8. Flood defences are another human factor contributing to the risk of flooding. The photo below shows a flood embankment on the River Eden.



Source: Flood bank, Rockcliffe
 cc-by-sa/2.0 - © Andrew Smith - geograph.org.uk/p/822670

- (a) Using the photo, explain how a flood embankment helps to reduce the risk of flooding.

- (b) What is the evidence in the photo that the land protected by the embankment is of relatively high value?

- (c) How might the embankment result in lower frequency but higher magnitude flooding?

9. Complete a summary table identifying those factors increasing the risk of flooding **in the Eden catchment**. Explain how each factor contributes to the flood risk. Suggest which factors are more important than others.

Factor likely to increase flood risk	Reasons why the flood risk is increased