3.6 UK Physical Landscapes: River Landscapes: 30-minute Pack

Total Marks

AQA 8035 · Calculators not allowed · about 30 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 This question is about soft engineering strategies for managing river flood risk.

(a) Name one soft engineering method of managing river flood risk. **(1)**

(b) Describe how this method reduces flood risk. **(2)**

(c) State one advantage of soft engineering methods compared with hard engineering methods. **(2)**

(Total for Question 1 is 5 marks)

2 Explain TWO factors, one physical and one human, that can increase the risk of a river flooding.

(Total for Question 2 is 4 marks)

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3 Explain how interlocking spurs form in the upper course of a river.

(Total for Question 3 is 3 marks)

4 'Hard engineering strategies are more effective than soft engineering strategies for managing river flood risk.' Assess the extent to which you agree with this statement.

(Total for Question 4 is 8 marks)

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5 State what is meant by each of these processes of river transportation.

(a) Traction **(1)**

(b) Saltation **(1)**

(c) Suspension **(1)**

(Total for Question 5 is 3 marks)

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6 This question is about a named UK example of a waterfall.

(a) Name a waterfall you have studied in the UK, and state its location. **(2)**

(b) Describe two features of this waterfall. **(2)**

(Total for Question 6 is 4 marks)

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Mark scheme · 3.6 UK Physical Landscapes: River Landscapes: 30-minute Pack

Question 1

(a) any valid soft engineering method, e.g. floodplain zoning, or river restoration, or afforestation (planting trees) in the drainage basin, oe **B1**

(a) Answer: For example, floodplain zoning.

(b) a valid point about how the method works or what it does, e.g. floodplain zoning restricts what can be built on land that is likely to flood; river restoration returns a straightened river to a natural course with meanders and wetlands; afforestation is planting trees in the drainage basin, oe **B1**

(b) a further, different valid point (how the method works or how it reduces flood risk), e.g. floodplain zoning keeps homes and valuable property out of the highest-risk areas by allowing only low-value uses such as farmland or parks on the floodplain; river restoration slows the flow and gives flood water space to spread out; trees intercept rainfall and take up water, so less runs off into the river, oe **B1**

(b) Answer: Floodplain zoning restricts building on land that is likely to flood, allowing only low-value uses such as farmland there, keeping homes and valuable property out of the highest-risk areas.

(c) any valid advantage, e.g. soft engineering is usually cheaper than building hard defences, oe **B1**

(c) linked detail, e.g. or it works with natural processes and has a smaller impact on the river's ecosystem/landscape, oe **B1**

(c) Answer: For example, soft engineering is usually cheaper than hard engineering, and it works with natural river processes rather than against them.

Question 2

physical factor, e.g. heavy or prolonged rainfall increases the volume of water reaching the river quickly, oe **B1**

linked detail, e.g. or impermeable rock/steep relief in the drainage basin, which increases surface runoff rather than infiltration, oe **B1**

human factor, e.g. urbanisation covers the ground with impermeable surfaces (roads, roofs), increasing surface runoff into drains and rivers, oe **B1**

linked detail, e.g. or deforestation reduces interception of rainfall by trees, so more water reaches the river more quickly, oe **B1**

Answer: Physical: heavy or prolonged rainfall (or impermeable rock/steep relief) increases surface runoff into the river. Human: urbanisation covers the ground with impermeable surfaces, increasing runoff (or deforestation reduces interception).

Question 3

in the upper course, a river has limited energy and mostly erodes vertically (downwards) rather than sideways, oe **B1**

the river is forced to wind (flow around) areas of harder, more resistant rock that it cannot easily erode, oe **B1**

this leaves ridges of land projecting into the valley from alternate sides, which interlock like the teeth of a zip as the valley is viewed from above, oe **B1**

Answer: In the upper course, a river erodes mostly downwards and has to wind around areas of harder rock rather than eroding through them, leaving ridges of land from alternate sides that interlock as the valley is viewed from above.

Question 4

Level 4 A detailed, well-balanced assessment that uses accurate, detailed reference to named hard and soft engineering strategies (and a named UK example); weighs their relative effectiveness, cost and impact, and reaches a clear, justified conclusion. **7-8**

Level 3 A clear assessment that uses accurate reference to hard and soft engineering strategies; a conclusion is reached, though the balance of the argument may be less developed or use less named detail. **5-6**

Level 2 Some relevant points about hard and/or soft engineering are made, with limited or generalised detail; a simple conclusion is given with little justification. **3-4**

Level 1 One or two isolated relevant points about flood management are made, with little or no comparison of strategies. **1-2**

Level 0 No relevant content. **0**

Indicative content:

- Hard engineering (e.g. dams/reservoirs such as Banbury Flood Storage Reservoir, embankments, channel straightening) can provide strong, reliable protection for the specific area it defends, and can protect large populations and valuable property.
- Hard engineering is expensive to build and maintain, can have negative impacts elsewhere (e.g. increasing flood risk downstream from channel straightening, or flooding land upstream to create a reservoir), and cannot remove all risk in extreme, rare events.
- Soft engineering (e.g. floodplain zoning, river restoration, planting trees in the drainage basin) is usually cheaper and works with natural river processes, often with wider environmental benefits (e.g. improved habitats).
- Soft engineering may be less effective at protecting existing developments that are already built on the floodplain, since it often relies on managing future risk rather than removing existing risk.
- Many real flood management schemes, including UK examples, actually combine hard and soft methods, suggesting effectiveness depends on using the right combination for the specific location, not just one approach.
- A well-supported conclusion should state a clear judgement on which approach (or combination) is more effective, backed by evidence from named examples.

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Question 5

(a) large, heavy material (e.g. boulders) is rolled along the river bed, oe **B1**

(a) Answer: Large, heavy material is rolled along the river bed.

(b) smaller stones and pebbles are bounced/hopped along the river bed, oe **B1**

(b) Answer: Smaller stones and pebbles are bounced or hopped along the river bed.

(c) small, light material (e.g. silt and clay) is carried within the flow of the water, oe **B1**

(c) Answer: Small, light material is carried within the flow of the water.

Question 6

(a) High Force **B1**

(a) on the River Tees, in County Durham, in the north Pennines, England **B1**

(a) Answer: High Force, on the River Tees, in County Durham, England.

(b) it has a drop of around 20 metres, making it one of the largest waterfalls in England by volume of water, oe **B1**

(b) it forms where the river flows over the resistant Whin Sill (a layer of hard igneous dolerite rock) lying above softer sedimentary rock, oe **B1**

(b) Answer: High Force has a drop of around 20 metres and forms where the River Tees flows over the resistant Whin Sill, a hard igneous rock layer, above softer sedimentary rock beneath.

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