03	1	One mark for the correct answer: C. 596106 No credit if two or more answers shaded. AO4 – 1 mark	1

03	2	One mark for the correct answer: D. A beach with groynes, a small coastal settlement and an A road No credit if two or more answers shaded AO4 – 1 mark	1

03	3	One mark for the correct answer: D. 3.4 km No credit if two or more answers shaded. AO4 – 1 mark	1

03	4	One mark for the correct answer: C. south west No credit if two or more answers shaded. AO4 – 1 mark	1

03	5	The answer requires application of knowledge and understanding to photographic and/or map evidence. Answers must suggest a *reason* for deposition: Eg The river transports considerable material/sediment downstream which is deposited at the river mouth/in the estuary (1) Longshore drift carries material along the coast, which is deposited where the coastline changes direction (1) There is a mixture of river and tidal currents which change direction and cause material to be dumped (1) The river may have reduced energy levels due to gentle river gradient/impact of incoming tides (1) The breakwater in 6115 may stop the movement of sediment and so it collects in the area behind (1) AO3 – 1 mark	1

03	6	<table><tr><th>Level</th><th>Marks</th><th>Description</th></tr><tr><td>2 (Clear)</td><td>3-4</td><td>AO1 Demonstrates accurate knowledge about coastal transport and depositional processes and coastal spit formation. AO2 Shows a clear geographical understanding of the interrelationships between coastal environments and processes. Explanations are developed.</td></tr><tr><td>1 (Basic)</td><td>1-2</td><td>AO1 Demonstrates some knowledge of coastal transport and depositional processes and coastal spit formation. AO2 Shows limited geographical understanding of the interrelationships between coastal environments and processes. Explanations are partial and limited in scope.</td></tr><tr><td></td><td>0</td><td>No relevant content</td></tr></table> Indicative content • Level 2 answers will contain linked statements showing understanding of the processes involved and the correct sequence of formation. Appropriate geographical terminology. • Level 1 will comprise simple ideas with limited or partial sequence and little reference to the processes involved. Geographical terminology will be limited. • The command is “explain”, so responses should provide a reasoned account of how and why a spit forms. • The question implies knowledge of the processes of transportation and deposition as well as a landform of coastal deposition. Emphasis is on explanation, so processes should be outlined as well as the sequence of formation. • The formation of a spit usually begins due to a change in the direction of a coastline. One source of material building up a spit is from longshore drift which brings material from further down the coast. Material is carried along the shore in a zigzag fashion by waves as they swash material up the beach at an angle and backwash material down the beach at a right angle. The material initially deposited is the largest material, dropped due to the reduction in energy. • Some material may also be derived from offshore sources and, more importantly, river-borne sediments. Credit processes of transportation such as traction, saltation and suspension. • Credit relevant labelled/annotated diagrams as part of the explanation of processes and the sequence of spit formation. • Where there is a break in the coastline and a slight drop in energy, longshore drift will deposit material at a faster rate than it can be removed and gradually a ridge is built up, projecting outwards into the sea - this continues to grow by the process of longshore drift and the deposition of material. A change in prevailing wind direction, or wave refraction, often causes the end of spits to become hooked (also known as a recurved lateral).	4

		• Water is trapped behind the spit, creating a low energy zone, as the water begins to stagnate, mud and marshland begins to develop behind the spit. • Spits may continue to grow until deposition can no longer occur, for example due to increased depth, or the spit begins to cross the mouth of a river and the water removes the material faster than it can deposited – preventing further build-up. • Credit reference to Figures 10 and 11 if linked to formation of spit. There is an area of relatively shallow and sheltered water where there is a change in the direction of the coast. Material derived from the cliffs to the south may have been transported northwards by longshore drift. As the spit grows across the river estuary, the length of the spit has been restricted by the river outlet washing sediment away. At various times, a short term change in wind direction may have resulted in a change in the direction of the spit, forming a curved end. A salt marsh has formed in the sheltered, low energy zone behind the spit. • Sequence of spit formation and some reference to processes involved required to access Level 2. AO1 – 2 marks AO2 – 2 marks	

03	7	6

Level	Marks	Description
3 (Detailed)	5-6	AO2 Shows thorough geographical understanding of hard engineering strategies used to protect the coastline. AO3 Demonstrates application of knowledge and understanding in a coherent and reasoned way in making a well-supported judgement about the issues and reaching a conclusion.
2 (Clear)	3-4	AO2 Shows some geographical understanding of hard engineering strategy (ies) used to protect the coastline. AO3 Demonstrates reasonable application of knowledge and understanding in making a judgement about the issues and reaching a conclusion
1 (Basic)	1-2	AO2 Shows limited geographical understanding of hard engineering strategies used to protect the coastline. AO3 May include limited application of knowledge and understanding in making a judgement about the issues and/or reach a conclusion.
	0	No relevant content

- Level 3 will be developed responses, with supporting evidence for answer, which might be balanced or based on definite decision. Appropriate terminology will be used throughout and the answer reaches a conclusion.

- Level 2 will have linked statements showing understanding of strategy (ies) and their effectiveness. Answers may be balanced or based on definite decision. Some geographical terminology evident.

- Level 1 will be simple statements with limited understanding or development. May consist of listed points or random statements about hard engineering strategies.

Indicative content

- Responses will apply knowledge and understanding of hard engineering strategies used in coastal environments, making a judgement about their effectiveness in protecting the coast from further erosion.

- The command is ‘explain your answer’, so responses should attempt substantiate the choice made. However credit responses which highlight one side of the argument, as well as those which take a more balanced approach before reaching a conclusion. There is no “correct” view-both sides can be credited, if supported with evidence.

- Understanding of hard engineering, which involves using artificial structures to control natural processes. These are designed to reduce wave energy or create a barrier between the land and sea, so storm waves can’t reach the cliffs.

- Strategies listed in the specification are sea walls, rock armour (rip-rap), gabions and groynes, but accept reference to other strategies such as revetments, tetrapods, offshore breakwaters, tidal barriers.

- Sea walls are long used and with proven effectiveness. They absorb and deflect wave energy back to sea. Recurved upper lips dampen down oncoming wave power. However they are expensive to construct and require regular repair. Erosion at the base can undermine sea wall foundations. They can cause down current scarring, where waves cause more damage to unprotected areas.

- Rip rap/rock armour consists of massive blocks of natural rock placed in position and piled up at the base of a cliff. They require less maintenance than a sea wall. If resistant rocks like granite are used they are barely eroded even under highest energy conditions. However they are expensive to extract, transport and place in position, (although less expensive than sea walls).

- Gabions are rock-filled wire cages placed along a vulnerable coast. They are cheaper than sea walls and flexible in design. They can absorb the pounding of wave energy. They can also improve drainage of cliffs and may eventually become vegetated and merge into the landscape. However after a few years they rust and can break apart under effect of heavy seas, therefore requiring regular repair and maintenance.

- Groynes are wooden or rock structures at right angles to a beach extending into the sea designed to capture longshore drift sediments. They are effective at increasing a natural barrier of beach between sea and shore, and can create calmer inshore water. However they require maintenance and repair and speed up downcoast erosion by robbing adjacent beaches of sand. The problem is therefore shifted, not solved.

- Credit concerns about using hard engineering techniques to protect the coast that go beyond cost and local effectiveness. They may interrupt natural systems more widely. Protection for some groups at one location is often at the expense of other groups further along the coast.

- Recent attempts to manage coastal processes have focussed on more sustainable strategies, considering the whole coastal zone. Hard engineering becomes just one of several strategies as part of shoreline management plans or integrated management.

- No credit for soft engineering, apart from comparative statements - soft engineering options are often less expensive than hard engineering options. They are usually more long-term and sustainable, with less impact on the environment.

- Credit named examples if relevant. Eg Mappleton coastal management scheme involved two types of hard engineering - placing rock armour along the base of the cliff and building two rock groynes. Mappleton and the cliffs are no longer at great risk from erosion. The rock groynes have stopped beach material being moved south from Mappleton along the coast. However, this has increased erosion south of Mappleton.

- Conclusion may emphasise that hard engineering can be a very effective

		way of preventing erosion in developed areas when used appropriately. However some hard engineering defences like groynes can cause problems for areas down the coast lacking coastal protection. • Explanation of two or more strategies is required for access to L3. AO2 – 3 marks AO3 – 3 marks	

04	1	One mark for the correct answer: B. 516977 No credit if two or more answers shaded. AO4 – 1 mark	1

04	2	One mark for the correct answer: C. 5101 No credit if two or more answers shaded. AO4 – 1 mark	1

04	3	One mark for the correct answer: A. 517985 No credit if two or more answers shaded. AO4 – 1 mark	1

04	4	One mark for brief outline or description of one feature of the river mouth. Eg There is much deposition of sediment/a small delta has formed The river cuts through the beach material. The river becomes narrower/straighter just before reaching the sea Accept any valid description No credit for reference to human features such as groynes or housing. No credit for wave processes/beach features. AO4 – 1 mark	

04	5	The answer requires application of knowledge and understanding to photographic and/or map evidence. Answers must suggest a reason for the additional straightened channel. Accept plausible suggestions. Eg The extra channel is a flood relief channel (1) It may have been built to take away surplus water from the drainage basin to the sea/or to reduce flooding upstream (1) The straight channel speeds up water flow, so reduces the amount of surface water (1) It could be built to help with irrigation of the surrounding farmland (1) AO3 – 1	1

04	6		4

Level	Marks	Description
2 (Clear)	3-4	AO1 Demonstrates accurate knowledge about fluvial transport and depositional processes and floodplain formation. AO2 Shows a clear geographical understanding of the interrelationships between fluvial environments and processes. Explanations are developed.
1 (Basic)	1-2	AO1 Demonstrates some knowledge of fluvial transport and depositional processes and floodplain formation. AO2 Shows limited geographical understanding of the interrelationships between fluvial environments and processes. Explanations are partial and limited in scope.
	0	No relevant content

- Level 2 answers will contain linked statements showing some understanding of the processes involved and the correct sequence of formation. Appropriate geographical terminology. It is not necessary to explain both erosion and depositional processes to be awarded top marks.

- Level 1 will comprise simple ideas with limited or partial sequence and little reference to the processes involved. Geographical terminology will be limited.

Indicative content

- The command is “explain”, so responses should provide a reasoned account of how and why a floodplain forms.

- The question implies knowledge of the processes of transportation and deposition as well as a landform of fluvial deposition. Emphasis is on explanation, so processes should be outlined as well as the sequence of formation.

- Floodplains are large, flat expanses of land that form on either side of a river. The floodplain is the area that a river floods onto when water level rises above the height of the channel.

- By the time it reaches the middle/lower course the river is wider and deeper and may contain a large amount of suspended sediment.

- As the river breaks its banks friction causes sediment to be deposited, the largest material first. This requires the most energy to be transported and therefore build up around the sides of the river forming raised banks or levées. Finer material such as silt and fine clays continue to flow further over the floodplain before they are deposited.

- When floods have receded, the flood plain is slightly higher due to the deposits of silt/alluvium caused by the river flooding. A flood plain is built up over hundreds of years. Each flood makes the flood plain higher.

- Lateral (sideways) erosion widens the river channel. The river channel is also deepened. A larger river channel means there is less friction, so the water flows faster. The force of the water erodes and undercuts the river

		bank on the outside of the bend where water flow has most energy due to decreased friction. On the inside of the bend, where the river flow is slower, material is deposited, as there is more friction. Gradually meanders gradually migrate downstream, creating a floodplain. The edge of a flood plain is quite often marked by a clear slope or bluff line, which is the extent of lateral erosion by the river. • Credit relevant labelled diagrams as part of the explanation of processes and the sequence of floodplain formation. • Credit reference to Figures 12 and 13 if linked to formation of a floodplain. The flat land next to the Cuckmere River consists of silt transported downstream. Every time the river floods further material is deposited, causing the floodplain to rise a little. The river meanders a great deal, cutting into the outer bank where the water flows fastest. This widens the floodplain. On the inside bend deposition occurs and gradually the meanders migrate across the whole floodplain. • Sequence of formation and some reference to processes involved required to access Level 2. AO1 – 2 marks AO2 – 2 marks	

<table>
<tr>
<td>04</td>
<td>7</td>
<td>
<table>
<tr><th>Level</th><th>Marks</th><th>Description</th></tr>
<tr><td>3 (Detailed)</td><td>5-6</td><td>AO2 Shows thorough geographical understanding of human factors affecting the risk of river flooding

AO3 Demonstrates application of knowledge and understanding in a coherent and reasoned way in making a well-supported judgement about the importance of physical and/or human factors affecting flooding, and reaching a conclusion.</td></tr>
<tr><td>2 (Clear)</td><td>3-4</td><td>AO2 Shows some geographical understanding of the human factors affecting the risk of river flooding

AO3 Demonstrates reasonable application of knowledge and understanding in making a judgement about the relative importance of physical and/or human factors affecting flooding, and reaching a conclusion.</td></tr>
<tr><td>1 (Basic)</td><td>1-2</td><td>AO2 Shows limited geographical understanding of factors affecting the risk of river flooding

AO3 May include limited application of knowledge and understanding in making a judgement about importance of physical and human factors affecting flooding, and/or reach a conclusion.</td></tr>
</table>

Level 3 will be developed responses, with supporting evidence for answer. Answers may be balanced or based on definite decision. Appropriate terminology will be used throughout and the answer reaches a conclusion.
Level 2 will have linked statements showing understanding of physical and/or human factors. Answers may be balanced or based on definite decision. Some geographical terminology evident.
Level 1 will be simple statements with limited understanding or development. May consist of listed points or random statements about physical and/or human factors.

Indicative content

Responses will apply knowledge and understanding of human and physical factors affecting flooding, making a judgement about the significance of human factors.
The command word is ‘explain your answer’, so answers should reach a conclusion and substantiate the choice made. Credit responses which highlight one side of the argument, as well as those which take a more balanced approach before reaching a conclusion. There is no “correct” view-both sides can be credited, if supported with evidence, although it is likely that many responses will agree with the statement.
Factors listed in the specification are precipitation, geology, relief and land use, but credit other factors such as snowmelt, levels of previous saturation, vegetation, soil type, obstacles such as bridges, and river management such as dams.

</td>
<td>6</td>
</tr>
</table>

		• Impermeable rocks (eg granite) and soil (eg clay) will not allow water to pass through, resulting in large amounts of surface runoff and a greater flood risk. • A drainage basin with a steep gradient will result in greater overland flow and higher flood risk than where the gradient is less steep, allowing more time for infiltration to occur. • Type, intensity, duration and amount of precipitation: eg heavy rain results in rapid saturation of the upper soil layers and the excess water therefore reaches streams quickly as surface runoff and increases food risk • Vegetated areas help to reduce flood risk by increasing the time it takes for water to reach a river (longer lag time) by encouraging infiltration (roots opening up the soil), intercepting water by their leaves and taking up water in their roots. • Land use and human Impact: man made surfaces such as concrete and tarmac are impermeable, therefore rivers in urban drainage basins tend to have short lag times due to higher amounts of surface runoff and drainage systems taking water to rivers quickly. Sloping roofs, guttering and underground drainage systems transfer water very quickly to rivers. The increase of house building in towns and villages, especially on river flood-plains has meant that rivers respond more quickly to storms and flood risk is therefore greater. • Deforestation may increase flood risk as interception and infiltration are reduced and runoff increases. Agricultural practices – such as ploughing up and down slopes can raise flood potential. Local flood management schemes such as channelisation that take water away from one area faster. • Credit examples where relevant, but these are not essential to gain max marks. • Evaluation of importance of human and/or physical factors may emphasise that precipitation is the primary factor in most floods, although its impact depends on several aspects such as intensity and duration. Flood risk is much more complex, and is affected by a combination of human and physical factors. • Some floods may be more affected by human factors than others- depending on proportion of built up area, level of tree cover, farming practices, artificial drainage. Many examples of floods where flood levels much higher as a result of human activity, others where physical factors dominant eg Boscastle- Heavy localised rainfall, saturated ground from previous rainfall, topography of the land, narrow river channels in the village itself. AO2 – 3 marks AO3 – 3 marks	