Component	Key idea	Detailed Content	Core Knowledge & Understanding	Keywords	Related topics	Icons
Investigation physical environments - changes along a river channel	**1 Formulating enquiry questions** **Understanding of the kinds of question capable of being investigated through fieldwork and an understanding of the geographical enquiry processes appropriate to investigate these**	*An enquiry question should relate to a geographical theory and/or example*	A key question or hypothesis follows on from the enquiry to be tested. For example: **How do river channel characteristics change along the River Cray?** A key question that follows on from this could be: **Does the depth and width of the River Cray increase from source to mouth?** A hypothesis could be: **The depth and width of the River Cray increases from source to mouth**	River channel Width Depth Bankfull Stream full Source Mouth Hypothesis	Topic 1	
	2 Fieldwork methods and techniques **Understanding of the range of techniques and methods used in fieldwork, including observation and different kinds of measurement**	*Fieldwork data collection must include at least:one quantitative fieldwork method to measure river discharge*	**Quantitative methods -** record data that can be measured as numbers e.g. using a tape measure to measure river width **Width (m)** - a tape measure can be stretched from one bank to the other at 90° to the course of the river. The start and finishing points for the measuring are the points at which the dry bank meets the water. To avoid drag induced by the tape making contact with the flowing water, and the consequent possible increase in distance measured due to the tape being stretched in to a curve, it should be stretched taught roughly 20cm above water level. The ends of the measured section should be determined by observation from directly above the tape at 90° to the ground. Observation from directly above the tape ensures that the margin of error is kept at a minimum. **Depth (m)** - Having established the width of the river, the next job is to find it's depth at regular intervals across it's width. The number of readings taken will depend upon the width of the river and the amount of detail you require. For most rivers intervals of 50cm are a good compromise between excessive work and loss of detail. The tape measure which was stretched from one bank to the other can be used as a guide to ensure that you take measurements in a straight line. It is also a convenient way of measuring the intervals between readings. **Deep Water** Taking depth readings with a rigid meter rule. A rigid meter rule is immersed in the water, every 50cm, until it just touches the bed of the river. It is held with its edge facing upstream, thus reducing to a minimum the surface area exposed to the running water. It is necessary to reduce the exposed surface area for two reasons. Firstly, the water may be flowing quite rapidly in places and its force can be sufficient to bend it out of the desired position at 90° to the river bed. The bend induced in the rule could result in an apparent increase in the depth being measured. Secondly,the water, upon meeting the face of the rule will form a bow wave. This pressure wave may result in an increase in measured water depth upstream of the rule and a decrease in measured depth downstream. By positioning the rule with its narrowest edge facing into the flow it is most resistant to flexing and least able to create a bow wave. Errors in the readings are thus kept to a minimum. If the water becomes too deep for a meter rule, a surveying pole or similar item can be used, the depth marked on it and then measured with a tape.	Quantitative Velocity Cross-section Discharge Primary data		

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Investigation physical environments - changes along a river channel	**2 Fieldwork methods and techniques** **Understanding of the range of techniques and methods used in fieldwork, including observation and different kinds of measurement**	*Fieldwork data collection must include at least:one quantitative fieldwork method to measure river discharge*	**Velocity (m/s)** - With a flow meter it is possible to obtain a measure of velocity in the field – if you do not have access to a flow meter you can take some measurements using a float and calculate velocity using the formula **Velocity = Distance/Time** Dog biscuits make good floats as they are not too easily moved by wind and break down in the water if swept away. Measure out 5 metres downstream Place the float in the water at the upstream end Start timing when you let go of the float When it reaches the end of your measured stretch stop timing Repeat three times and calculate a mean time **Cross-sectional area (m^2) of a river channel** - width (m) x mean depth (m) **Discharge (m^3 per second)** - cross sectional area (m^2) x velocity (m/s)			
		Fieldwork data collection must include at least: one qualitative fieldwork method to record the landforms that make up the river landscape	**Qualitative methods** - record descriptive data e.g. constructing a **field sketch** River landforms can be recorded using annotated field sketches or annotated photographs. These can be used to look at a view of the whole landscape from a given point, or in detail at given features. **Observations** - labelling of features correctly **Describe** - clear labelling and feature descriptions **Explain** - label features, describe features and begin to explain features formation (annotate) **Sketch** - all of the above is met with visual sketch of features, and use of title, orientation and scale **Link** - labels, descriptions, explanations, and now linking to wider landscape with processes and further examples	Qualitative Observations Characteristics Processes Features Annotated Field sketch		
		Secondary data is data that somebody else has already collected	A **flood risk map** e.g. Environment Agency flood risk map One other **secondary source**	Secondary data		
		Sampling methods	**Random sampling** - selecting a site to measure, at random. Random sampling is unbiased as places are not specifically selected **Systematic sampling** - collecting data in an ordered or regular way, eg every 5 metres **Stratified sampling** - dividing sampling into groups, eg three sites from each section of river. It is possible to combine stratified sampling with random and systematic sampling	Random Systematic Stratified		

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Investigation physical environments - changes along a river channel	**3 Data presentation methods** **Processing and presenting fieldwork data in various ways including maps, GIS, graphs and diagrams (hand drawn and computer-generated)**	*Data presentations should be suitable and appropriate for the data being presented*	**GIS** can be a useful way of presenting your data. Located proportional symbols show changes in discharge with progression downstream **Cross-sectional area** - draw a line graph with the width on the X-axis and the depth on the Y-axis. **Make sure your line graph shows the shallowest depth at the top of the Y-axis and the deepest depth at the bottom of the Y-axis** **Pie charts** - useful for presenting % of sediment using Powers' Index **Field sketches** - annotated to show processes, characteristics, landscape features etc. **Line graphs** - to show changes in velocity at distance from the source **Located maps** - to show site location, relief/topography of area and land use **Photographs** - annotated photos to show characteristics, landscape features, managment etc.	GIS Line graph Pie Chart Mean Median Mode Range		
	4 Data Analysis **Analysing and explaining data collected in the field using knowledge of relevant geographical case studies and theories**	*Data analysis should be specific to **your** fieldwork enquiry, **your** location and **your** data*	**General questions describing your results:** Describe the pattern shown on the graph/map/table/results Pick out any changes over distance or location (spatial changes) Use the data as evidence: calculate the mean median or mode to describe the distribution of the data. Use maximum and minimum data to describe the range of data. Describe the scale and direction of flows Using statistical tests describe the relationship between sets of data. Is the correlation positive or negative? Are there any anomalies in the data? **General questions explaining your results:** What reasons can you give to explain the results? How do the results fit in with your enquiry question? How do the data sets link together? Can you use one set of data to explain another? Can you explain why there are anomalies?	Analysis Describe Explain		
	5 Conclusion **Drawing evidenced conclusions and summaries from fieldwork transcripts and data**	*Conclusions should 'answer' **your** fieldwork enquiry questions using **your** data presentation and **your** data analysis*	**General questions reaching a conclusion:** Can you prove or disprove your hypothesis? Describe any statistical evidence for your conclusions. How do your results fit in with other case studies or theories? What conclusion can you reach about your Enquiry questions?	Conclusion		
	6 Evaluation **Reflecting critically on fieldwork data, methods used, conclusions drawn and knowledge gained**	*Evaluations should include reflections on the whole process of your fieldwork enquiry*	**General questions to evaluate your enquiry:** What data collection methods were reliable? What data collection methods were accurate? If your fieldwork methods were not accurate or reliable, what could you do to improve them? If the data from your fieldwork methods were not able to prove or disprove your hypothesis, why was this? Was your hypothesis inappropriate? Is your analysis of your data vaild? How effective was your data presentation techniques in assisting your data analysis? If you were to complete another investigation along the River Cray what would you do the same and what would you do differently? Why?	Evaluation Justify		