0 4 **Figure 8** shows a local newspaper article. A student decided to use this as a starting point for planning a fieldwork investigation.

Figure 8

Local Councillors Express Concern over coastal management.

Local councillors are concerned that a coastal management scheme a few kilometres away is having a negative impact on their own beaches. At a council meeting, councillors said that, since a multi-million pound scheme to construct new wooden groynes further north, residents had noticed that the beach was shrinking! They are concerned that homes here will be at risk as the wide beach protects them from the full force of the waves. Speaking after a council meeting last week, Mrs Smith, a local councillor and life-long resident of the town said;

"It's simply not right" The new groynes up the coast are trapping the sediment and depriving our own beach of sand and shingle! It might protect their residents but tourists come here because of our beach and now this is disappearing in front of our eyes!"

Not everyone at the meeting agreed. One councillor commented;

"The beach here has changed over the years, but I'm not sure that these changes have got worse since they built the new defences up the coast."

The council has decided to let the people have a say and will be holding some focus groups in town to discuss how the local residents feel about changes to their coastline.

0 4 . 1 Comment on how useful **Figure 8** would be in helping to plan a local fieldwork enquiry.

[4 marks]

0 4 . 2 After further reading, the student decided to investigate evidence that the coastal management strategy of constructing groynes was having a negative impact on a neighbouring beach. **Figure 9** shows their plan.

Figure 9

	Data processing and presentation
Method – Primary	
Beach survey at **'managed'** and 'unmanaged' section of the coastline to include: • recording beach gradient using clinometers and ranging poles from the shore to the cliff • survey of size and shape of sediment on a transect from shore to cliff. Size measured and shape classified according to published index • measurement of sediment depth either side of the groyne • survey of longshore drift using painted pebbles at 'managed' beach to understand the direction of sediment movement.	• Beach profiles, widths and cross-sectional areas compared. • Located graphs to show the differences between sediment size and shape at the two locations. • Located graphs of sediment build-up and direction of sediment movement. • Direction of movement annotated onto base map.
Photos	Identify sediment build-up at groynes and differences in beach width.
Questionnaire to residents.	Opinions of residents about the effectiveness of coastal defences– code qualitative data and compare opinions about the impacts of coastal defences in the two locations and possible other suggested reasons for changes. Basic statistics to show if the defences are viewed favourably by residents in each location.
Interviews with: • local councillor • business owner • planning officer • elderly resident. Pre-planned prompts used to keep interview focused and recorded.	Qualitative analysis of opinions about how the coastal management plan has worked in the past and how the new plan is impacting on the coastline of the two areas.
Method – Secondary	
Aerial photographs.	Annotated to show differences in the width of the beaches in the two locations.
Old photographs and maps.	Annotated on base maps to show changes in beach width over time.

Outline a health and safety issue that the student would need to consider when planning to undertake the investigation described in **Figure 9**.

[2 marks]

0 4 . 3 Outline any ethical issues that may arise from conducting the interviews outlined in **Figure 9**.

[2 marks]

0 4 . 4 **Figure 10** shows the student's conclusion to their investigation.

Figure 10

There was evidence that the new groynes had interrupted the supply of sediment carried by long shore drift. Secondary data showed that there had been a 30% decline in beach width in the 'unmanaged' section since the groynes had been built. Primary data showed that there was a 40% higher accumulation of sand on the northern side of the new groynes, suggesting a significant entrapment of beach material and slowing of the movement of beach material by longshore drift. Movement of pebbles confirmed that material was likely to be moved southward by the sea. The gradient and shape of the beach was significantly different at each location. The beach to the north was steeper, and the mean pebble size was twice that of the beach to the south. The cross-sectional area of the northern beach was also significantly higher. This suggested that larger material is becoming trapped by the groynes, leading to a beach to the south that is not only narrower, but also flatter and with finer material. Local residents felt this was significant because it was the changing nature of the beach, as well as its width, that was contributing to the increased rates of erosion of the cliffs they had observed over the winter. However some residents felt that other factors, such as rising sea level and increased storm events may have played their part in how the beach had changed.