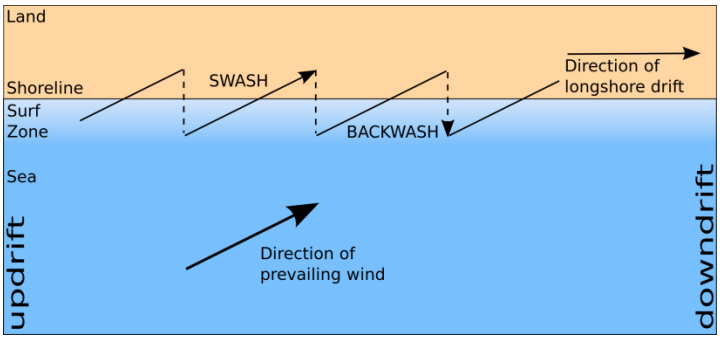
GCSE GEOGRAPHY KNOWLEDGE BOOK

FIELDWORK PHYSICAL STUDY

PHYSICAL STUDY: HARD ENGINEERING IS CONTROLLING LONGSHORE DRIFT AT SHERINGHAM

The information here is what students **MUST** know. If you hope to get a grade 7-9 GCSE, you will need to extend your knowledge through additional reading, the online textbook, and revision guides. You will also need to work very hard at mastering responses to a variety of challenging command words. Use this as a checklist to identify what is clear to you, what you need to work on and what you can tick off once revised. If you have doubts or questions, please come and see your teacher – we will be very happy to help.

Key Content	What you need to know	I get this	I need to work on this	I've revised it!
Hypothesis word for word recall	Hard engineering is controlling longshore drift at Sheringham			
Geographical Theory	**Longshore drift** occurs when a **prevailing wind** comes into an **angle** to the coast. This in turn drives the waves at an angle at the beach which drives the **swash and sediment up an along the beach**. The **backwash**, which gets its energy from **gravity,** drags the sediment back **perpendicular** to the beach (straight down at rights angles). This process is repeated so sediment is moved sideways (laterally) along the beach.  **Groynes** are a form of **hard engineering** that are used to **control longshore drift.** The purpose of a groyne is to create and maintain a healthy beach on its **'updrift side'.** Groynes act as a barrier to physically stop sediment transport (longshore drift). This causes a **build-up** of the beach on the groyne's **updrift** side. At Sheringham we should therefore see a **'build-up of sediment'** on the **updrift side** (and depletion) of the groynes as evidence of hard engineering controlling longshore drift. **DIRECTIONAL OF LONGSHORE DRIFT** **DOWNDRIFT**  **UPDRIFT**			

Why was Sheringham a good location?

1. Beach was easily accessible and within walking distance of the coach park this was an advantage because all students could access all data points in a relatively safe, low risk environment

2. The beach had a number of groynes which we could measure this was an advantage because we could show any changes over distance and establish any patterns. The data would be representative and reliable.

3. Sheringham's tide went well out during the day which meant that we could collect our data with relatively low risk of accidents occurring such as drowning.

Why was it a suitable topic?

1. Beach was easily accessible and within walking distance of the coach park – suitable because all students could access all data points in a relatively safe, low risk environment

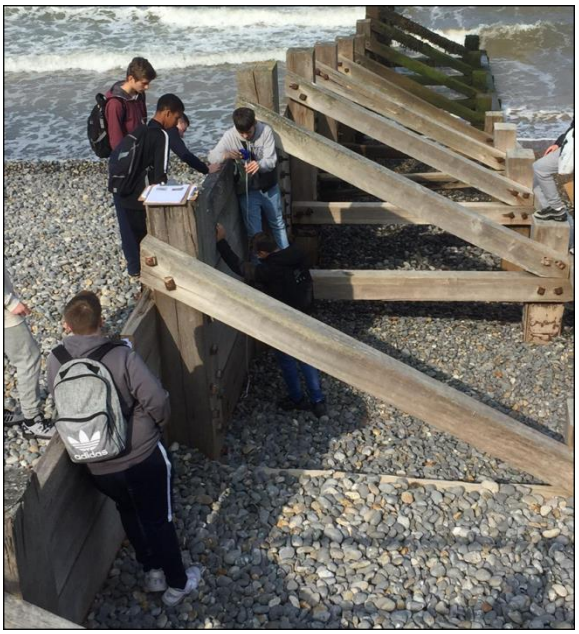
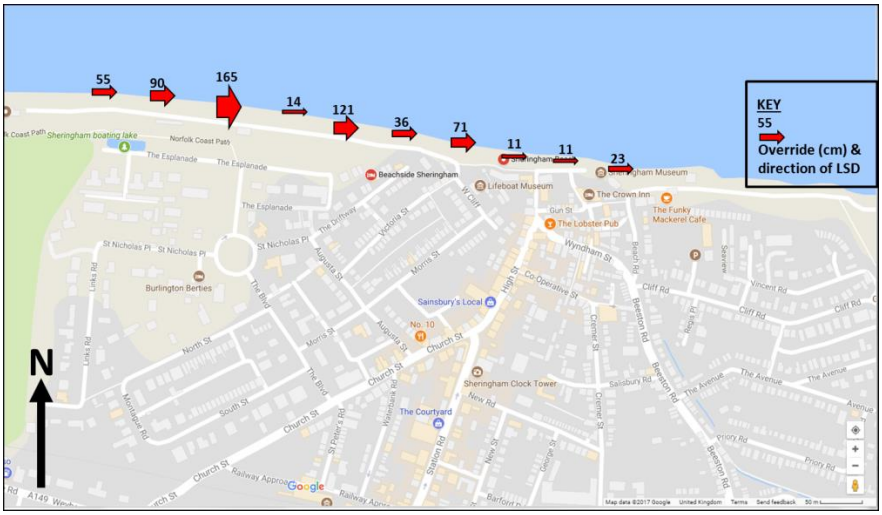
2. The beach had a number of groynes which we could measure – suitable because data available and we could show any changes over distance and establish any patterns. The data would be representative and reliable.

Risk Assessment

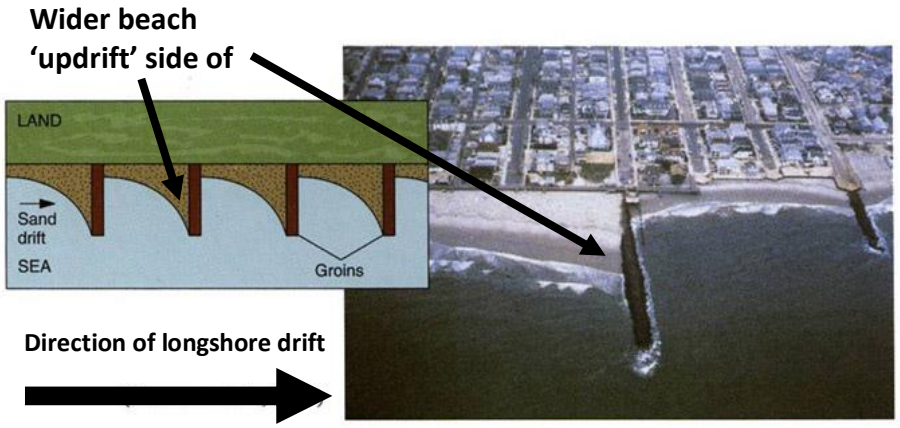
Risk/Hazard	Who might be involved	Severity (a)	Likelihood (b)	Level of Risk (a) x (b) (H/M/L)	Precautions/Risk Management
Coach may be involved in a crash/accident to or from destination	Students, staff & driver	4	1	4 = Low	All students and teachers to remain seated throughout journey and wear seatbelts
Getting caught in waves in wave study	Staff and students	3	2	6 = Low	Always collect data from at least 5 metres above the swash zone (maximum extent of swash reached)
When walking from car park to beach students could get hit by a car walking down narrow streets of Sheringham	Staff and students	4	1	5 = Low	Walk in single file and stay on shop side of road. Staff can walk at the front, middle and back to manage stduents

Sampling Method

- Used **<u>systematic sampling</u>** over **<u>10 groynes</u>** which were spaced out **<u>50 meters apart</u>** across Sheringham beach – WHY?
- See patterns established over distance and so makes data more reliable

Justification of Primary Data Collection Method(s)	Hard engineering is controlling longshore drift at Sheringham  1. We measured the **sediment drop either side of groynes** - links directly to the **theory of longshore drift and groyne management**. Groynes are used to control longshore drift and theory suggests that sediment should build up on the updrift side and be depleted on the downdrift side – could see if hard engineering was controlling longshore drift 2. Measured **10 groynes equally spaced out every 50m** so any pattern is **representative and reliable** 3. Deemed **representative and reliable** as pattern of sediment would have been established **over time** - so we could see if groynes were controlling dominant movement of sediment (i.e. longshore drift) 4. Photos – **to cross-reference** and support sediment drop measurements of groynes			
Data Presentation – what do we use and assess why it is appropriate and/or asses how effective it is	**Located Proportional Arrow Diagram to Show Direction of Longshore Drift and Difference in Sediments Heights on The West and East Side of Groynes at Sheringham**  			

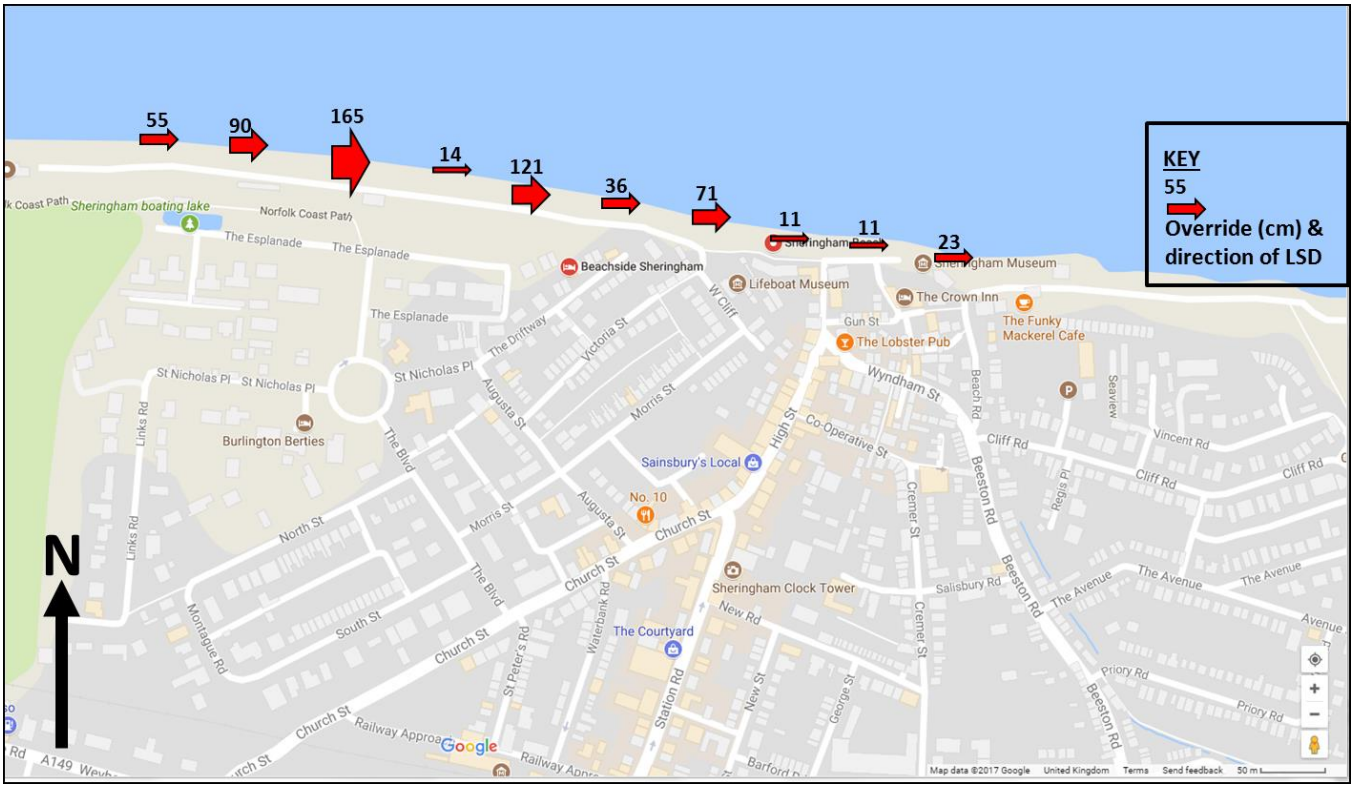
	1. Proportional arrows **deemed appropriate/effective** because they **indicate difference and variation** in sediment drop on the West and East side of the groynes so I **could easily identify patterns and trends** along the coast. 2. It links directly to the hypothesis – it was **easy to analyse** and was a **clear visual representation** – to show direction of longshore drift that is being controlled. 3. The **numbers in centimetres** next to the arrows **deemed appropriate/effective** as it **clearly indicates difference and variation in sediment drop** on the West and East side of the groynes and links directly to the hypothesis – **can compare the sediment drop** of every single groyne – easy to identify longshore drift is being controlled. 4. The data is located on a map with **a compass and a scale** – **deemed appropriate** as it places data on Sheringham beach to give context of place and **gave a clear indication of changes across the beach at Sheringham – it was therefore easy to analyse and interpret.** 5. **HOWEVER** an option could be **'more appropriate' or 'effective'** if we placed annotated photo of each groyne on the map to further **visually enhance** the idea of sediment drop variation either side of each groynes - therefore we would be even more secure in demonstrating the fact that hard engineering is controlling longshore drift at Sheringham – **it would have been easier perhaps to visualise the changes and lead to clearer interpretation and visually compare the west and east side differences.**			
Results and Conclusions	1. The sediment drop was **lower on all 10 groynes** on the **west side** of the groynes compared to the east side. The average difference in sediment drop from the **west to east was 59.7 cm** with the **maximum difference being 165cm** and the **lowest 11cm.** This difference is caused by groynes trapping sediment and stopping it form moving sideways from west to east. 2. **Photos** show clearly the west side drop lower than the east side drop on every groyne thus supporting the measurements. 3. **Secondary research** also indicates the reason that groynes were built at Sheringham was to control the longshore drift. **<u>CONCLUSION:</u> Accept the hypothesis** – hard engineering is controlling longshore drift at Sheringham for all the reasons above  			
Evaluation of Methods – Problems and Limitations	• Pebbles made it difficult to get the **base point consistent** and some of the groynes had **erosion either side compared to the beach** – **results may not be accurate (so could choose consistent point or take piece of wood to lay on beach)** • Only measured **towards back of beach** where there was **beach nourishment** so not getting full picture along the groynes and could **human interference influence the data? (so could measure sediment drop every 2m along the entire length of the groynes)** • **Inconsistent** where we chose to measure groyne – results may not be accurate (as above) • **Only one day** – could be a secondary wind pattern over last couple of months **(could return every month to get pattern over time to ensure looking at longshore drift trends)**			

Evaluation of Methods – What other Methods could we use to make our results and conclusions more reliable?	• **Measure change in width of beach** – theory suggests if groynes are controlling longshore drift the beach will be **wider on the updrift side** of the groynes compared to the downdrift side.  			
Evaluation – to what extent were our results and conclusions useful and reliable	• The main method used to collect our data was valid to a **certain extent** and it was **backed up and was consistent** with the **photos** we took and the **secondary data** we collected which meant our **results were useful and therefore our conclusion was to an extent reliable**. • The sediment drop either side of the groyne was a valid method as it identified a **pattern that had been established over time**. It showed that **every single one of the 10 groynes had a lower sediment drop on the west side of the groyne compared to the east** – the **average difference in drop was 59.7 cm**, with the **greatest difference** being **165cm** and the **lowest difference** being **11cm**. • The photos at each groyne also backed up the conclusion that the groyne was controlling longshore drift from the west by indicating a lower sediment drop on the west side. **This is both useful and reliable as the difference in height can only be accounted for by the sideways movement of sediment being trapped by the groynes.** • **The local council** also published the fact that the **single purpose of groynes being built in Sheringham was to control the west to east longshore drift**. This secondary data is **reasonably accurate and reliable** as the **council are justifying the high costs of building groynes** and they would not spend the money on hard engineering if there was no longshore drift that needs controlling. • **The linking and consistency between these three data sets** supports our main conclusion that hard engineering is controlling the longshore drift at Sheringham and **therefore this conclusion is reliable.** • However, the primary data collected is **only reliable to a certain extent and arguably to a lesser extent than the secondary data** as there were some inaccuracies in the way the data was collected. • We only measured the **back of the beach which was where the beach nourishment** was and so the validity of the data is **questionable** as we are unsure if the pattern we identified was consistent right down the length			

	of the groynes or whether it was affected in any way by the **presence of human interference** with the sediment on the beach. In a similar sense we only took photos of the back of the beach. • It was also difficult to measure the **base of the pebbles as the ranging poles sank** in and so we may have inaccurate results. The limitations in our methods causes some doubt about how **accurate our data** is and therefore how **reliable our conclusion** is. • Overall: o results from **secondary data** are **reasonably reliable** and therefore **useful** o results from the sediment drop measurements and photos were **reliable to an extent** but **not quite so secure** (lesser extent than the secondary data) o it is likely though that as all **three data sets linked and backed up** each other's findings then our main conclusions that hard engineering is controlling longshore drift at Sheringham **is most likely correct and can be trusted.** o If I repeated the enquiry I would ensure we measure every 2m along the groyne from back to front and measure the sediment drop either side of the groyne at each location. I would also take more photos; **however I believe we would get the same conclusion** which indicates that our conclusions this year are reliable but not 100% so.			

PRIMARY DATA RESULTS

A Located Proportional Arrow Map to Show Sediment Drop Difference (Override) on the West and East side of the Groynes at Sheringham Beach



SECONDARY DATA

http://www.geocases1.co.uk/printable/Coastal%20defences%20in%20Norfolk.htm

In 1949 the Coast Protection Act provided legislation that gave a Coastal Protection Authority the power to carry out whatever work they deemed necessary for the protection of any land in their area. In North Norfolk, responsibility for coast protection was with the Urban and Rural District Councils of Wells, Walsingham, Sheringham, Erpingham, Cromer and Smallburgh. In 1974, North Norfolk District Council was formed and assumed the coast protection responsibilities of the former Urban and Rural Councils.

Sheringham town frontage is protected by a seawall/promenade with a groynage system in front…….the groynes at Sheringham include both wooden and rock structures……

'The purpose of a groyne is to create and maintain a healthy beach on its updrift side'. This is achieved through two main processes……**groynes acting as a barrier to physically stop sediment transport (sand) in the direction of littoral drift through the system. This causes a build-up of the beach on the groyne's updrift side…….**