AQA
Realising potential

A-LEVEL

A-LEVEL GEOGRAPHY
(7037)

Marked investigation with commentary

EXAMPLE NEA INVESTIGATION

An example investigation folder with completed proposal form and examiner commentary

How do the characteristics of the beach and sediment vary along Chesil Beach on the Jurassic Coast, Dorset?

Version 1.0 November 2017

Contents

2018 candidate record form

A-level Geography
NEA Independent fieldwork investigation (7037/C)

Please attach the form to your candidate's work and keep it at the centre or send it to the moderator as required. The declarations should be completed by the candidate and teacher as indicated.

Centre number

Click here to enter.

Centre name

Click here to enter text.

Candidate number

Click here to enter.

Candidate's full name

Click here to enter text.

Work submitted for assessment **must** be the candidate's own. If candidates copy work, allow candidates to copy from them, or cheat in any other way, they may be disqualified.

Candidate declaration

Have you received help/information from anyone **other than** subject teacher(s) to produce this work?

☐ No ☐ Yes *(give details below or on a separate sheet if necessary).*

Click here to enter text.

Please list below any books, leaflets or other materials (eg DVDs, software packages, internet information) used to complete this work **not** acknowledged in the work itself. Presenting materials copied from other sources **without acknowledgement** is regarded as deliberate deception.

Click here to enter text.

From time to time we use anonymous examples of candidates' work (in paper form and electronically) within our guidance materials to illustrate particular points. If your work appears in AQA materials in this context and you object to this, please contact us and we will remove it on reasonable notice.

I have read and understood the above. I confirm I produced the attached work without assistance other than that which is acceptable under the scheme of assessment.

Candidate signature.

Date Click here to enter a date.

Teacher declaration

I confirm the candidate's work was conducted under the conditions laid out by the specification. I have authenticated the candidate's work and am satisfied (to the best of my knowledge) that the work produced is solely that of the candidate.

Teacher signature.

Date Click here to enter a date.

Candidate number	Candidate's full name
Click here to enter.	Click here to enter text.

NEA proposal

To be completed by the candidate

Investigation title: How do the characteristics of the beach and sediment vary along Chesil Beach on the Jurassic Coast, Dorset?

How the title links to the specification content

Chesil Beach is a coastal depositional landform (a Tombolo or Barrier Beach) This links to the specification as it will be an investigation into a depositional landform on the coast so links in with Coastal Systems and Landscapes – in particular it links with 3.1.3.2 Systems and Processes as it looks at a high energy coast and the processes of deposition also 3.1.3.3 Coastal Landscape Development – as it is looking at a depositional landform and also the role of sea level change as this was involved in the original formation of Chesil Beach.

Planned investigation hypothesis or question/sub-questions

The gradient of the beach will increase from North-west to South-east
The size of the beach sediment will increase from North-west to South-east along the beach
Chesil Beach will be exposed to powerful wind and waves from the West

Investigation focus – indication of how the enquiry will enable the candidate to address the investigation title and explore the theme in relation to the chosen geographical area

I will be investigating the shape of the beach at different points and also the sediment size and shape. And I will be trying to link these to the processes involved in the formation of Chesil Beach in the past and also the processes operating on Chesil Beach today. I hope that my fieldwork will support the theory and predictions in the secondary research and background on Chesil Beach. I will visit locations along the beach so that I can compare the characteristics along its length.

Planned methodology – indication of qualitative and/or quantitative techniques including primary and, if relevant, secondary data collection techniques. Indication of the planned sampling strategy or strategies

Primary Data Collection
I will visit five sites along the Beach – Burton Bradstock, West Bexington, Abbotsbury, Chesil Visitor Centre and Chiswell – this is aiming at systematic as I am trying to look along the whole length of the beach – however I am limited by access in some areas of the beach. At each location, I will measure beach profiles – using stratified sampling – to allow me to compare the size and shape of the beach along the feature. I will also take a random sample of pebbles and measure their size and shape – this will be a mixture of quantitative and qualitative techniques. In each location, I will also measure the wind and wave direction, wind strength and try to estimate the direction of longshore drift as this is a key thing affecting the beach.
Secondary Data Collection
I plan to try and find secondary data on wind and waves and maybe some photos of the beach under different conditions

Data collection: ☐ Individual ☐ Group

To be completed by the teacher

Teacher approval for the investigation or details of any necessary amendments that need to be made before approval can be given

This seems like a reasonable investigation with a clear link to the specifications and a good range of techniques identified. You will need to think carefully about the sample sizes of the pebbles to ensure that you collect enough data. You will be working with other students to collect some of the data so make sure that you clearly indicate on your write up which techniques you carry out that are unique to your project. What statistical methods will you use to analyse your data?

☒ Approved ☐ Approved subject to the implementation of amendments above ☐ Resubmission required

Full name: Click here to enter text.

Teacher signature.

Date: Click here to enter a date.

To be completed by the teacher
Marks must be awarded in accordance with the instructions and criteria in the specification.

Area	Level	Overall level	Mark	Comment
Area 1. Introduction and preliminary research **10 marks** (a) To define the research questions which underpin field investigations (AO3)	3	3	8	Clear identification of question and hypotheses within proposal form and introduction. Clear reference to specification links in proposal form. There is reference to theory from background reading within the introduction and appropriate evidence of literature review.
(b) To research relevant literature sources and understand and write up the theoretical or comparative context for a research question (AO3)	3			
Area 2. Methods of field investigation **15 marks** (a) To observe and record phenomena in the field and devise and justify practical approaches taken in the field including frequency/timing of observation, sampling, and data collection approaches (AO3)	4	4	14	Good use of range of fieldwork techniques which are described and justified clearly and sampling also explained and justified. Thorough use of techniques to collect a large amount of valuable and reliable data.
(b) To demonstrate practical knowledge and understanding of field methodologies appropriate to the investigation of human and physical processes (AO3)	4			
(c) To implement chosen methodologies to collect data/information of good quality and relevant to the topic under investigation (AO3)	4			

Area	Level	Overall level	Mark	Comment
Area 3. Methods of critical analysis **20 marks** (a) To demonstrate knowledge and understanding of the techniques appropriate for analysing field data and information and for representing results, and show ability to select suitable quantitative or qualitative approaches and to apply them (AO3)	4	4	18	Very good use of a variety of techniques to present and analyse data – including effective data presentation in the form of maps and graphs and use of statistics including means and standard deviation. Shows good understanding of results and what they show and also an awareness of limitations of some of these results and conclusions. Shows ability to link fieldwork results to theory and background and begins to show how this increases geographical understanding.
(b) To demonstrate the ability to interrogate and critically examine field data in order to comment on its accuracy and/or the extent to which it is representative, and use the experience to extend geographical understanding (AO3)	4			
(c) To apply existing knowledge, theory and concepts to order and understand field observations (AO2)	4			
Area 4. Conclusions, evaluation and presentation **15 marks** (a) To show the ability to write up field results clearly and logically, using a range of presentation methods. (AO3)	4	3	11	Well written and structured report with a range of presentation methods. Detailed reflection on the research and realistic evaluation of the data collected. Has been clearly able to link to the background theory and is aware of the ethical dimensions of fieldwork.
(b) To evaluate and reflect on fieldwork investigations, explain how the results relate to the wider context and show an understanding of the ethical dimensions of field research. (AO3)	3			
(c) To demonstrate the ability to write a coherent analysis of fieldwork findings in order to answer a specific geographical question and to do this drawing effectively on evidence and theory to make a well-argued case. (AO3)	3			
	Total (60 marks)		51	

Details of additional assistance given

Record here details of any assistance given to this candidate which is beyond that given to the class as a whole and beyond that described in the specification (*continue on a separate sheet if necessary*).

Click here to enter text.

Concluding comments

Click here to enter text.

Research question clearly identified – area 1a

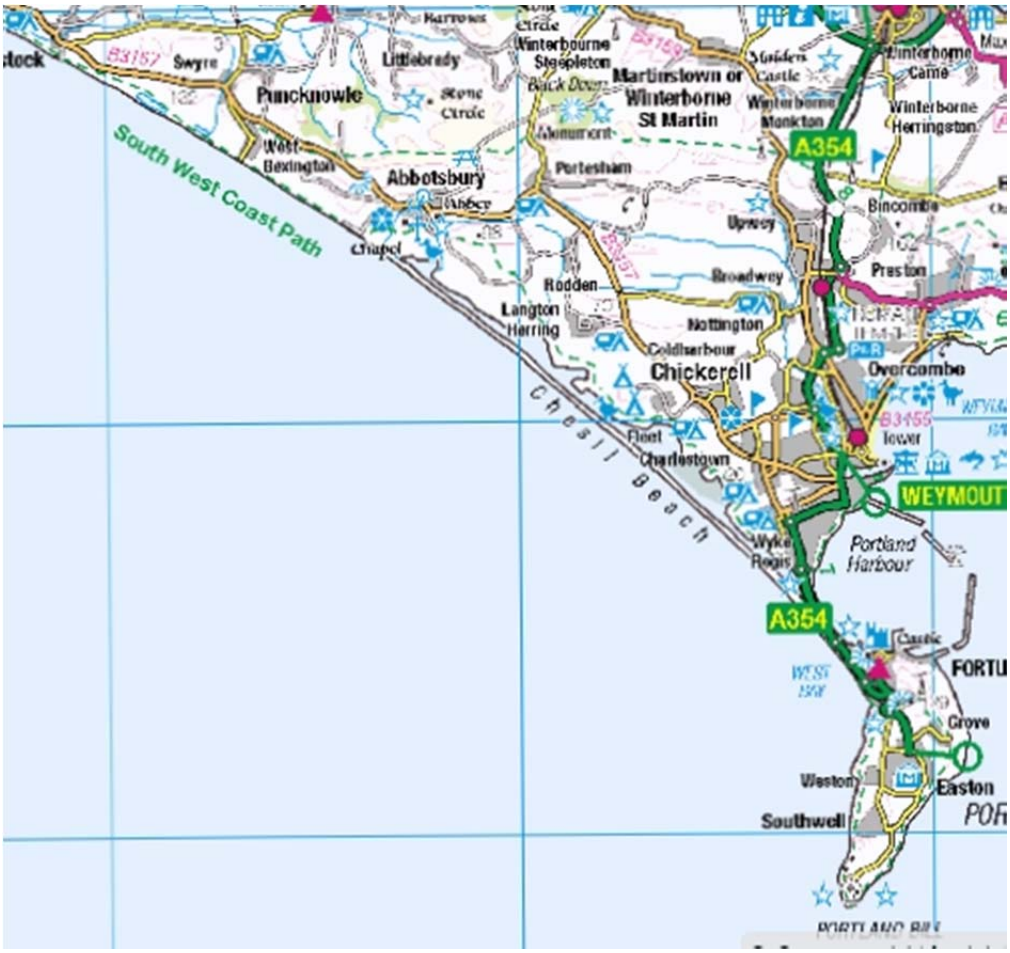
How do the characteristics of the beach and sediment vary along Chesil Beach on the Jurassic Coast, Dorset?

Introduction

Chesil Beach is depositional landform in Dorset and lies on the Jurassic Coast World Heritage Site. It is sometimes described as a Tombolo and sometimes as a barrier beach. The landform has obvious changes from one end to the other and this is what I am hoping to investigate in this piece of work.

Chesil Beach lies between Burton Bradstock in the west and Portland in the east. It is 18 miles long and up to 200 metres wide. It is 15 m high in some places and contains 180 billion pebbles. (Dorset Wildlife Trust figures). Between Abbotsbury and Weymouth, the beach does not lie exactly along the coast but has trapped water behind to create the Fleet which is about 8 miles long.

Study area clearly located and background theory discussed – area 1b



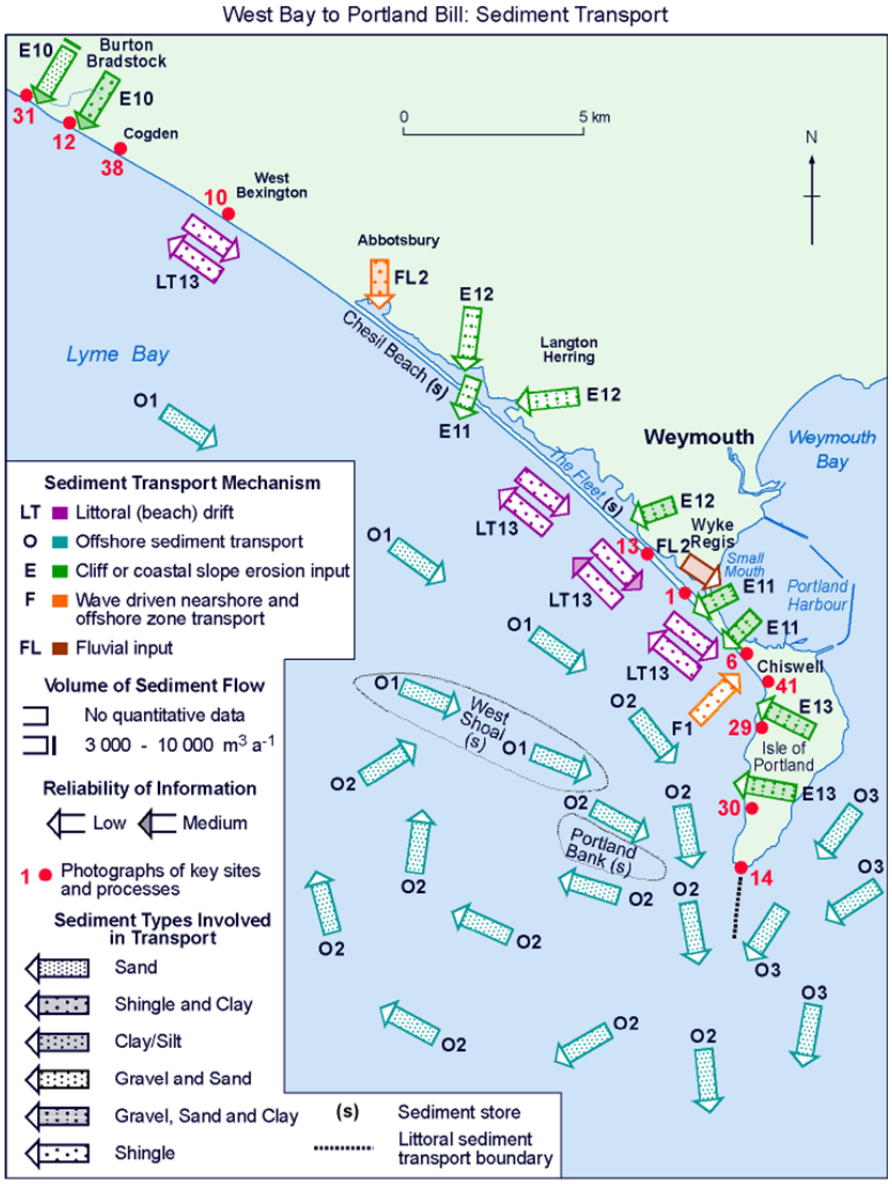
Chesil Beach is often described as a Barrier Beach as it formed due to changing sea levels linked to climate change and glaciation. However, it could also be classed as a Tombolo as it joins an island to the mainland. During ice age times, (about 25,000 years ago) the sea level was much lower and the edge of the sea would have been further away from the present-day coast. On the land lots of rock was broken up by weathering and erosion and carried into the sea by ice, meltwater and rivers. This resulted in a large volume of rock on the sea bed. As the sea level rose about 10,000 years ago at the end of the ice age the rock material was carried up with the rising sea level and deposited along the coast to

Reference to background theory and concepts – referenced later within analysis – area 1b

form Chesil Beach. Over time the action of the waves has moved the shingle around along the beach by longshore drift and also helped to smooth the pebbles through attrition. So, the beach was formed by long ago processes but is being molded by current processes.

There are approximately 180 billion pebbles making up Chesil Beach (Dorset Wildlife Trust).

This section of the coast is a High Energy Coast and it is exposed to powerful wind and waves from south west. The power of waves is affected by the wind as they are created by the wind. The power is a result of the wind strength, length of time the wind has blown and also the fetch – the distance over which the wind has blown. Wind and waves along this stretch of the coast have formed over the Atlantic and can have a fetch of up to 7,000 kilometres. The predominant direction of longshore drift is from the west to the east and this moves the pebbles in that direction as shown by the scopac map below.



Background theory – areas 1b

However, sometimes there is a weaker, less common direction of longshore drift going from east to west. This picks up only the smaller pebbles so over time there has been sorting of pebbles along the beach with the largest near Portland the smallest near Burton Bradstock. Local folklore says that fisherman, sailors and smugglers who knew this coast well could pick up a handful of pebbles and know exactly where they were by the size of the sediment even if they were in the fog.
It is also thought (Dorset Wildlife Trust) that bigger pebbles are more easily moved by longshore drift which would also result in the sorting of pebbles along the beach.
As part of the course we have studied coastal landscapes and looked at the role of wind and waves in the formation of landforms, including depositional landforms. I am hoping to have a better understanding of these processes by carrying out this investigation.

Hypotheses identified – area 1a

I have made several predictions or hypotheses

1. The size of sediment will increase from north-west to south-east along the beach – this will be due to the sorting of the sediment by longshore drift

2. The gradient of the beach increase from north-west to south-east – shingle and pebbles beaches tend to have steeper gradients than sandy beaches so I would expect to see the gradient increase as the size of beach material increases

3. Chesil Beach will be exposed to powerful wind and waves from the south-west – I expect to find that the wind and waves hitting Chesil Beach are very powerful as it is a high energy coast and I expect they will have a big influence on the beach

Methodology

Techniques

I visited Chesil Beach on Thursday 17th August and Friday 18th August to carry out my fieldwork. The weather was sunny and dry but breezy on both days. I visited a number of sites and carried out the following data collection techniques:
Beach Profiles
Pebble size and shape
Wind and wave measurements
Longshore drift measurements
Photographs
I worked with a small group of students to collect some of the data – beach profiles and wind and waves – but the pebble data was unique to my own investigation so I collected this independently.

Clear account of data collection sites and justification for their selection – area 2a

Data collection sites

I visited five sites along Chesil Beach as I wanted to investigate how the beach characteristics changed along its length. The sites were at Burton Bradstock, West Bexington, Abbotsbury, Chesil Beach Visitor Centre and Chiswell. These sites allowed me to get a good coverage from each end of the beach so were fairly systematic. However, I could not get exactly equal distances along the beach which would have been ideal because it was difficult to get to the beach in places and the section between Abbotsbury and Weymouth has no road access and is located along the Fleet and so not accessible.

Risk assessment – partly relevant, eg awareness of ethical issues related to other beach users – area 4b

Hazard	What are the risks	How will we minimise the risks
Weather conditions	Chesil Beach is very exposed so there is no shelter from sunshine in the summer and also from wind and rain – risk of sunburn, or getting wet and hypothermia	Check weather forecast before visit Use sun cream, hats and drink plenty of water Bring warm and waterproof layers and wear them if conditions change
Waves and sea	Chesil Beach is steeply sloping and the water gets deep very quickly and the waves can be big and powerful Risk of being knocked over by waves, slipping into sea and drowning or being washed along coast by waves	Wear sensible shoes to give comfortable grip Observe waves and beach carefully before and during fieldwork and keep well back from the water Start profiles a short distance away from edge of sea Take care throwing apple into water and do not attempt to get it back
Beach litter	There is the chance of finding broken glass, dog mess or rubbish from ships washed up on the beach – the risk would be cutting yourself or picking up germs from the dog mess or rubbish	Look carefully at the beach when carrying out the fieldwork, especially when collecting pebble samples. Don't touch any beach rubbish. Wash hands after visit and before eating and drinking or use hand gel if not toilets.

Detailed account of methods used and justification of methods and sampling – area 2a, 2b and 2c.

Some awareness of limitations – area 4b

Other beach users	Chesil beach is popular with anglers so there is a danger of getting tangled in lines or inconveniencing them The beach is also a popular tourist destination	Keep well away from anglers and their lines especially when measuring longshore drift Be aware of other beach users and keep tapes, ranging poles etc. away from them
Fieldwork equipment	Ranging poles have sharp ends and tape measures metal ends which could cause injury.	Carry poles upright and use carefully. Take care when using tapes especially when windy

Beach profiles

I carried this out at each site to allow me to see how the size and shape of the beach varied at each site and to see if there was a link between the beach profile and the size of pebbles along the beach.

Beginning close to the sea we placed a ranging pole in the beach – ensuring that we held it upright and tried not to push too far into the pebbles as this would affect the accuracy of the readings. A second ranging pole was placed at the next change of slope and then using a tape measure held horizontally we measured the distance between the two poles. By holding the tape tight and horizontally we could also work out the vertical change in height between the two poles by using the ranging poles as points of reference.

To ensure that we followed a straight line we followed a compass bearing when placing the ranging poles in the beach and we also had to place the pole at shorter distances rather than change of slope if it was steep and there was likely to be too big a change in height.

This was stratified sampling as the distance along each section varied every time, however it should be a more accurate representation of the beach as it should reflect the real change in the shape.

The main limitation was the difficulty in holding the tape exactly horizontal, particularly in the wind and with the longer sections of the beach. We did make sure that one person stood to the side each time to check for the level. However, to extend this technique further we could also take a spirit level and use that to check the level.

Detailed account of methods used and justification of methods and sampling – area 2a, 2b and 2c.

Some awareness of limitations – area 4b

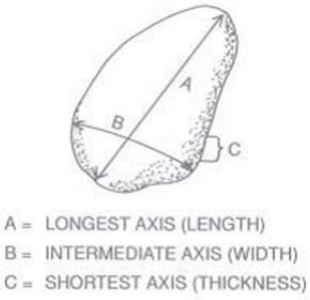
Pebble data

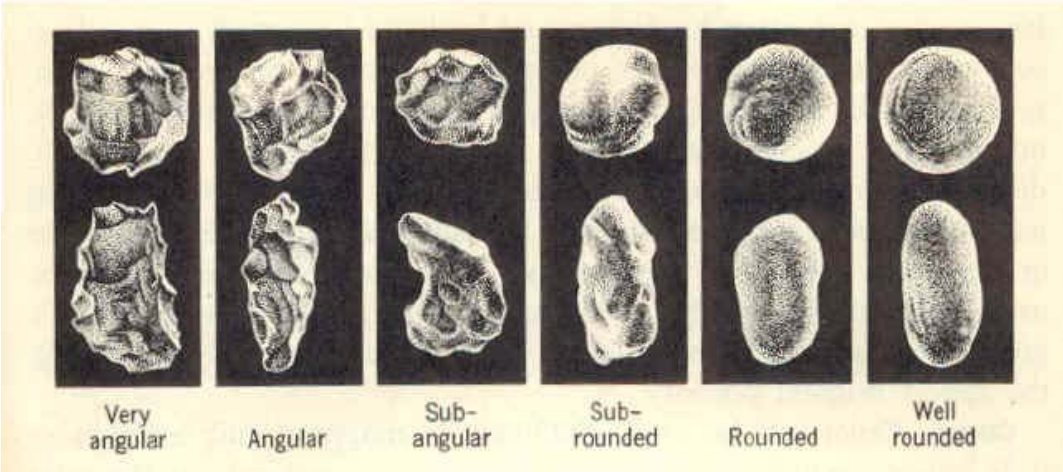
I collected this data because I wanted to see how the size of the pebbles, and also the shape, varied along Chesil Beach. This would be useful as it would help to support the theory that there are two directions of longshore drift along the coast here and that this has resulted in sorting of the pebbles.

I wanted to use random sampling to ensure that I got a good representative sample of pebbles from the beach and to stop me simply choosing the ones that I thought looked nice. I laid two tape measures down with 10m sections making two axes. I then used a table of random numbers to give me pairs of random numbers. I used the two tapes like a graph and if the numbers were 2 and 5 I would go to 2 metres along one tape, 5 metres along the other and where the two distances met would take a pebble from the beach for the sample. I repeated this 50 times.

With each pebble, I measure the longest length (a axis) using the callipers – this was a quantitative method and told me how big the pebbles were. I also classified the pebble based on its shape- using the 6 categories from angular to well rounded. This was more of a qualitative method as it was based on my opinion of the shape of the pebble. The group a pebble was put into might vary depending on who was carrying out the fieldwork.

If I were to extend the project I might also want to think about taking samples of pebbles from different areas of the beach – such as the foreshore or the back of the beach. I could also measure the A, B and C axes and do more calculations on the shape of the pebbles and their degree of roundness.





Wind data

At each site, I measure the wind using a hand-held anemometer. I ensured that the same person carried out this measurement at each site and held the equipment at the same height. The anemometer was held in the wind for two minutes and an average reading recorded. I also recorded the direction from which the wind was blowing. This was systematic sampling as I was carrying it out at sites along the length of Chesil Beach.
This method was good as it used an instrument to measure the wind so was more reliable than trying to guess the wind speed using the Beaufort Scale. However, when writing my report, I must remember that this wind speed was only measured once on one day so is a very limited picture when considering the wind patterns along the beach during the year. Ideally, I would visit at different times of the year and under different weather conditions to collect a more varied and representative sample of the wind. I will also use secondary data from the Met Office for the wind when carrying out my discussion and analysis.

Wave data

At each site, I also noted the direction from which the waves were coming using a compass, the type of wave (constructive or destructive) and carried out a wave count to see how many waves were breaking each minute. I wanted to see what role the waves had in shaping the beach and its sediment.
This was also systematic sampling as I was carrying this out at intervals along the beach.
Again, like the wind, this was only one set of data carried out on one day and so is not necessarily representative of the waves along the beach throughout the year. In fact, I have seen video clips with some very powerful waves that have

Detailed account of methods used and justification of methods and sampling – area 2a, 2b and 2c.

Some awareness of limitations – area 4b

Use of apple for longshore drift – ethical dimensions – area 4b

completely overtopped the beach.

Longshore Drift

I wanted to see how the rate and direction of longshore drift affected the beach shape and beach material. I estimated the direction and rate of longshore drift at each site by placing an apple into the edge of the sea. I used a ranging pole as a marker and then time five minutes. At the end of this time I was able to work out the rate and direction that the apple had moved. I used an apple as it was too dangerous to try and get the apple back at each site and so it was something that was biodegradable and so not cause any pollution. This is not exactly the same as measuring longshore drift with a stone but would give me some idea of the direction and rate of movement.

Secondary research

I used secondary data on the wind and waves to try and build up a picture of how they vary through the year.
I used a number of websites:
wind.willyweather.co.uk/sw/dorset/portland-harbour.html
myweather2.com/City-Town/United-Kingdom/Dorset/Chesil-Beach/climate-profile.aspx
these were useful sources of data as they provided me with some average weather data for the whole year which will give me a better understanding of the role of wind in the formation and processes of Chesil Beach.

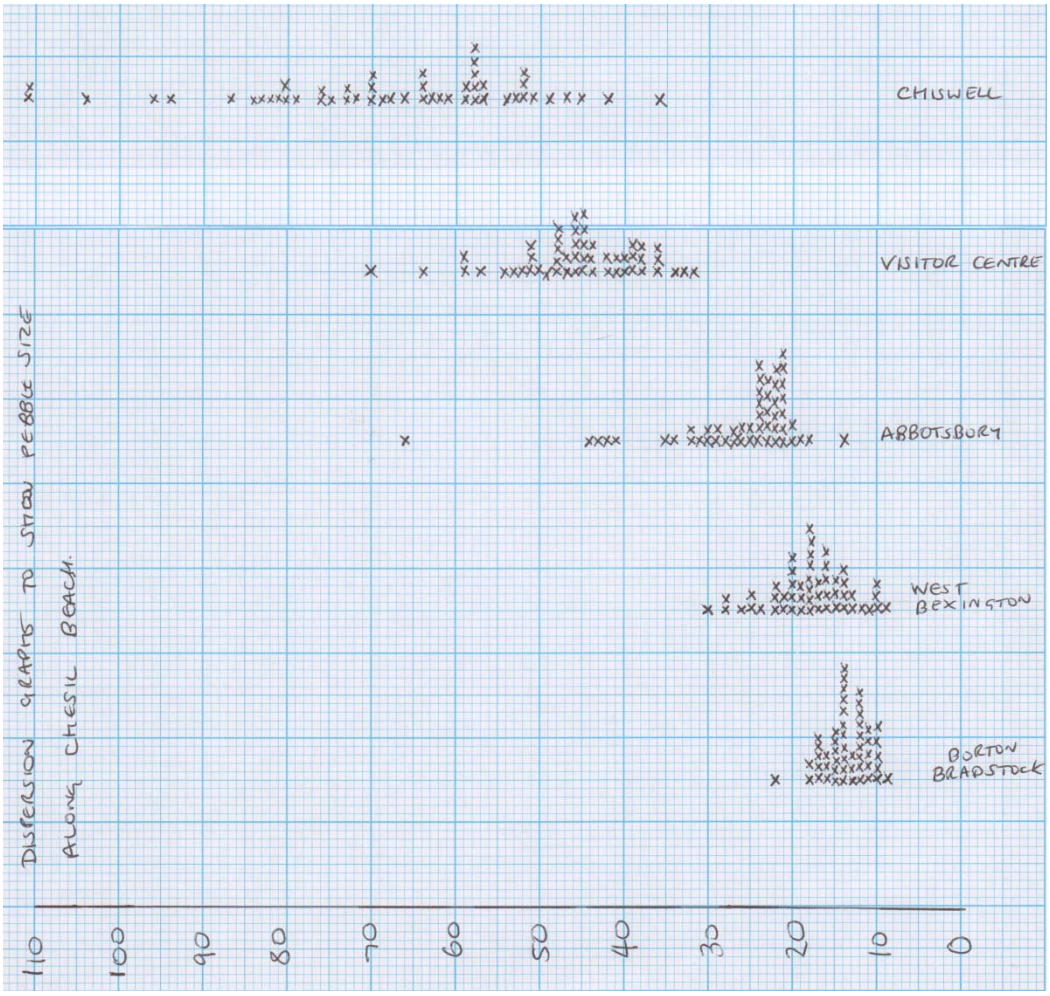
Analysis of results

Detailed analysis of results with reference to values and data – use of appropriate statistical techniques – area 3a and 3b

Some reference to background theory and research – area 3c

Pebble size and shape

Using an Excel spreadsheet helped me to quickly analyse my pebble data – I was able to calculate means, largest and smallest pebbles and sort the pebbles into different shape groups.
There is a clear pattern from the data I collected of an increase in pebble size along Chesil Beach with pebbles increasing from 13.62 mm at site one to 67.66 mm at site five. This is an increase of nearly five times along Chesil Beach. This is quite a dramatic change along the beach which is only 18 miles long in total.
The change is not steady, between sites one and two the increase was only 1.3 times but between sites three and four the increase was 1.7 times. This may well be because the gaps between my data collection sites was not equal although I did try to get even coverage I was limited by access to the beach. This change in size supports the theories in my secondary research and also local legends. It is said that local fishermen, smugglers etc. would always be able to locate themselves even in the mist by picking up a handful of pebbles from Chesil Beach as the pebble are so well sorted.
My dispersion graph shows that there are some anomalies in pebble size at each beach but generally there is a clustering pattern at each site around the mean. There does seem to be a larger spread of results at site five than at sites one, two and three.



I carried out a standard deviation calculation – again using Excel for ease of calculation – and worked out the values for sites one and five as they seemed to have the biggest contrasts in dispersion. Site one had a standard deviation of 2.61 and a mean of 13.62. this means that 67% of the stones lie between and 11.01 mm and 16.23 mm. However, site five had a much bigger standard deviation of 16.58 which suggests a bigger spread of results as my dispersion graph suggested. At this site 67% of my pebbles were between 51.08 mm and 84.24mm.

This could possibly be as a result of the measurement of larger stones being easier to identify variations whilst at the smaller end it might be more difficult to determine between small pebbles of very similar sizes. Although it is hoped that using callipers should have tried to eliminate this. The variation is size might also suggest that moving and sorting of the pebbles is still an active process and that it is likely to continue into the future.

The pebbles have clearly been sorted by longshore drift in the two directions. The most dominant direction being along Chesil Beach towards Portland in the SE and the weaker direction moving back towards the NW. The pebbles of all sizes are moved towards Portland but only the smaller ones returned as this direction of longshore drift is weaker and less common. This was supported by my longshore drift measurements as on the days I collected my data the waves appeared to be moving towards Portland.

The majority of pebbles at all five sites were generally rounded in shape. This would be because the action of the sea would be smoothing off the pebbles by

the process of attrition with rock pieces knocking into each other and being eroded to become smoother and more rounded. The data collected does seem to show that there are more rounded and well-rounded pebbles at sites three, four and five whilst at sites one and two there are a few more angular and sub angular pebbles. This may well be due to the action of the sea smoothing off the pebbles and making them more rounded. However, you would expect that to have created smaller, more rounded pebbles at the NW end as these pebbles are likely to have been moved in both directions by longshore drift and so to have been affected more by attrition. It might be that with smaller pebbles it was more difficult to identify the shape and also as I have already mentioned this is a subjective data collection technique and the same member of the group did not assess the shape at each site. This is something that I would consider carefully if I was to repeat this type of investigation again.

It would also be interesting to see if there were differences in shape between the different type of rock that make up Chesil Beach. This could be a further line of inquiry but would require quite a lot of time and research as it is not always easy to identify the different types of rock and there are several different types along the beach – including chert, flint, quartzite and granite.
Using an Excel spreadsheet helped me to quickly analyse my pebble data – I was able to calculate means, largest and smallest pebbles and sort the pebbles into different shape groups as well as calculating the standard deviation.

Pebble sizes at each site

Note the increase in size from site one to five. Also at site one there is a mixture of sand and pebble beach material.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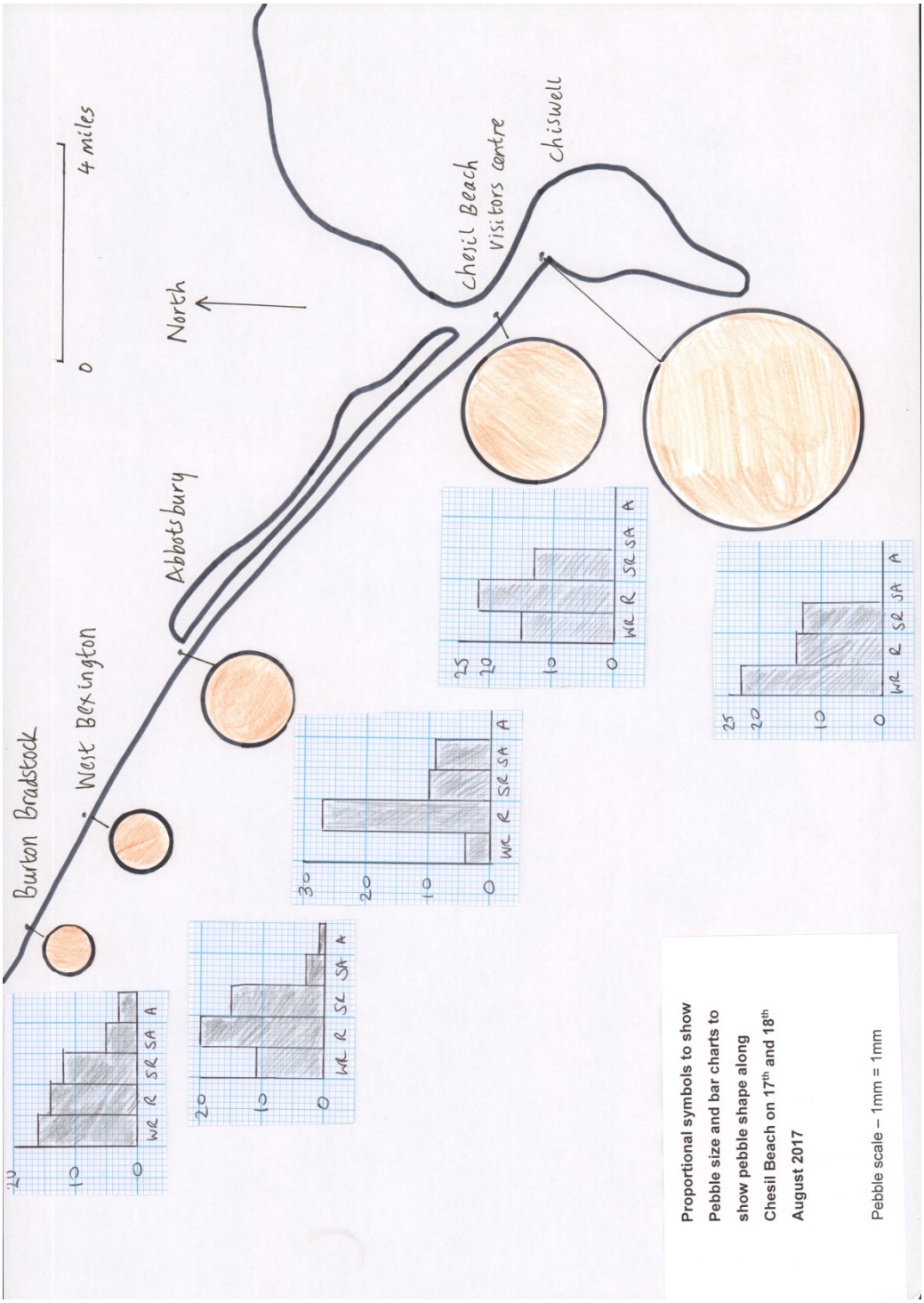
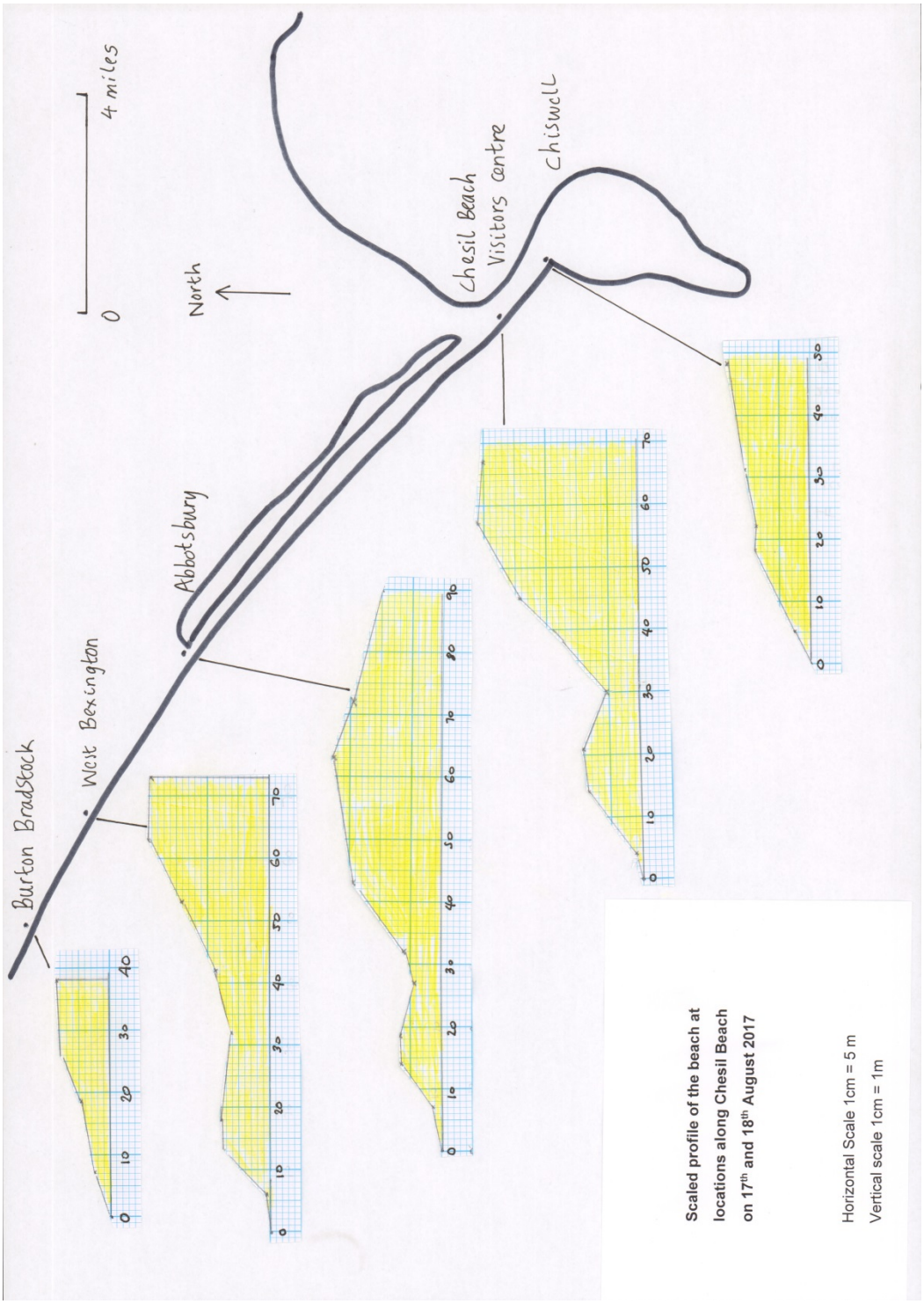

Burton Bradstock
West Bexington
Abbotsbury
Chesil Beach Visitors centre
Chiswell
North
0
4 miles
WE R SE SA A
Proportional symbols to show Pebble size and bar charts to show pebble shape along Chesil Beach on 17th and 18th August 2017
Pebble scale – 1mm = 1mm

Detailed analysis of results with reference to values and data – use of appropriate statistical techniques – area 3a and 3b

Reference to background theory and research – area 3c

Beach profiles

I expected to see that as the beach material increased in size towards Portland then we would also see an increase in gradient of the beach.
By comparing my beach profiles, I can notice the following patterns. The gradient at the front of the beach is much gentler at site one with a slope angle 2^{o} compared to angles of 8^{o},10^{o} and 6^{o} at sites three, four and five.
I was quite surprised to see that the beach angle at site two was quite a lot more than site one 5^{o}. This was surprising as there is little difference in pebble size at these two sites. However, at site one there is still a significant amount of sand on the beach as can be seen in the photographs. This could explain why the beach is more gentle here as snady beaches do tend to have a lower gradient.
The steepest beach is at site four with gradients varying between 7^{o} and10^{o}. Although this site doesn't have the largest pebbles it does have generally quite big pieces of rock material. Also, there is a wide-open space behind the beach here so that the landform has been able to develop to become a wide, tall beach with a steep front exposed to the powerful wind and waves.
At site five you would expect to find the biggest beach with the steepest gradient as the pebble sizes are much bigger. However, because of the shape of coast here and the concrete sea wall the beach is very contained and is quite a lot narrower than in other sections, only 43.5 meters wide. This is the far end of Chesil Beach and there is only a small area at the end of Portland where the rock can be deposited and built up to form the beach in this location. However, this area of beach does have a steep beach gradient.
Site one beach is also quite narrow at only 37.26 metres wide. This is the far NW end of Chesil Beach and the coast changes here to cliffs. Behind the section of the beach that we measured there is a more resistant section of rock which has created a low cliff preventing rock material from being carried further inland creating a wider beach. At West Bexington and Abbotsbury there is low lying land behind the beach and mainly vegetation so there is plenty of space for the beach to have been deposited further inland. At site four at the Chesil Visitor Centre there is also low-lying land and a flat marshy area at the end of the Fleet so there is nothing to prevent a wide beach building up here.
Any beach is dynamic and changing all the time and Chesil Beach especially so as it is exposed to strong wind and waves. The beach profiles that I measured would be very different if I measured them at a different time. In fact, the beach is likely to change dramatically after storms and strong winds. It is estimated that 300 million tonnes of rock can be taken from the beach during some storms. These pebbles would be taken offshore but replaced on the beach again when wind and wave conditions changed. However, the profile of the beach will have changed as a result of these processes.


Burton Bradstock
West Bexington
Abbotsbury
Chesil Beach Visitors centre
Chiswell
North
0
4 miles
Scaled profile of the beach at locations along Chesil Beach on 17th and 18th August 2017
Horizontal Scale 1cm = 5 m
Vertical scale 1cm = 1m

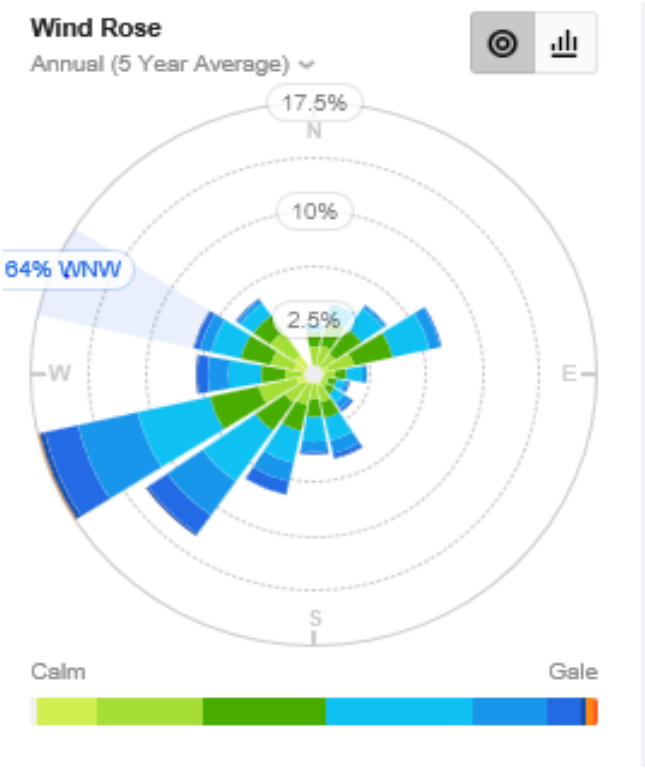
Detailed analysis of results with reference to values and data – use of appropriate statistical techniques – area 3a and 3b

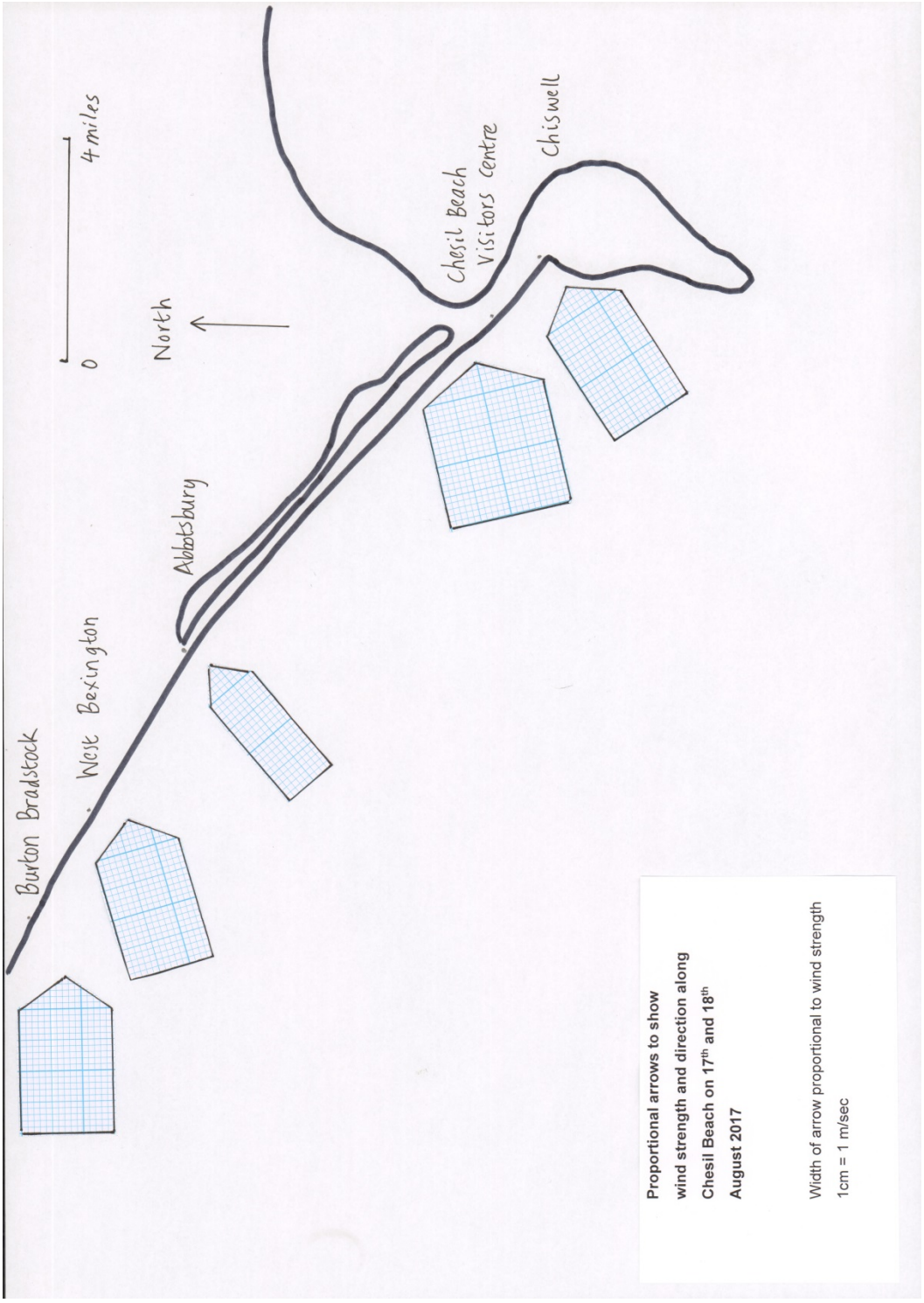
Reference to background theory and research – area 3c

Wind, waves and longshore drift

When carrying out my fieldwork I found that the wind was predominantly blowing from the west or southwest. This was as I expected at SW is the prevailing wind and the dominant wind direction that creates longshore drift along Chesil Beach. There were some variations in wind speed from 3.5 to 7.9 m/sec. We did try to collect this data in a reliable fashion by the same person holding the anemometer at the same height for the same length of time but there was possible some variability as the wind was gusty at times and so the results may have varied.

Clearly collecting wind data on only one occasion is not very reliable and so I would ideally visit again through the year to collect a more reliable set of data. However, I did some secondary research and found that wind did seem to be blowing from the west and southwest on most occasions – see wind rose for Portland, Dorset below.





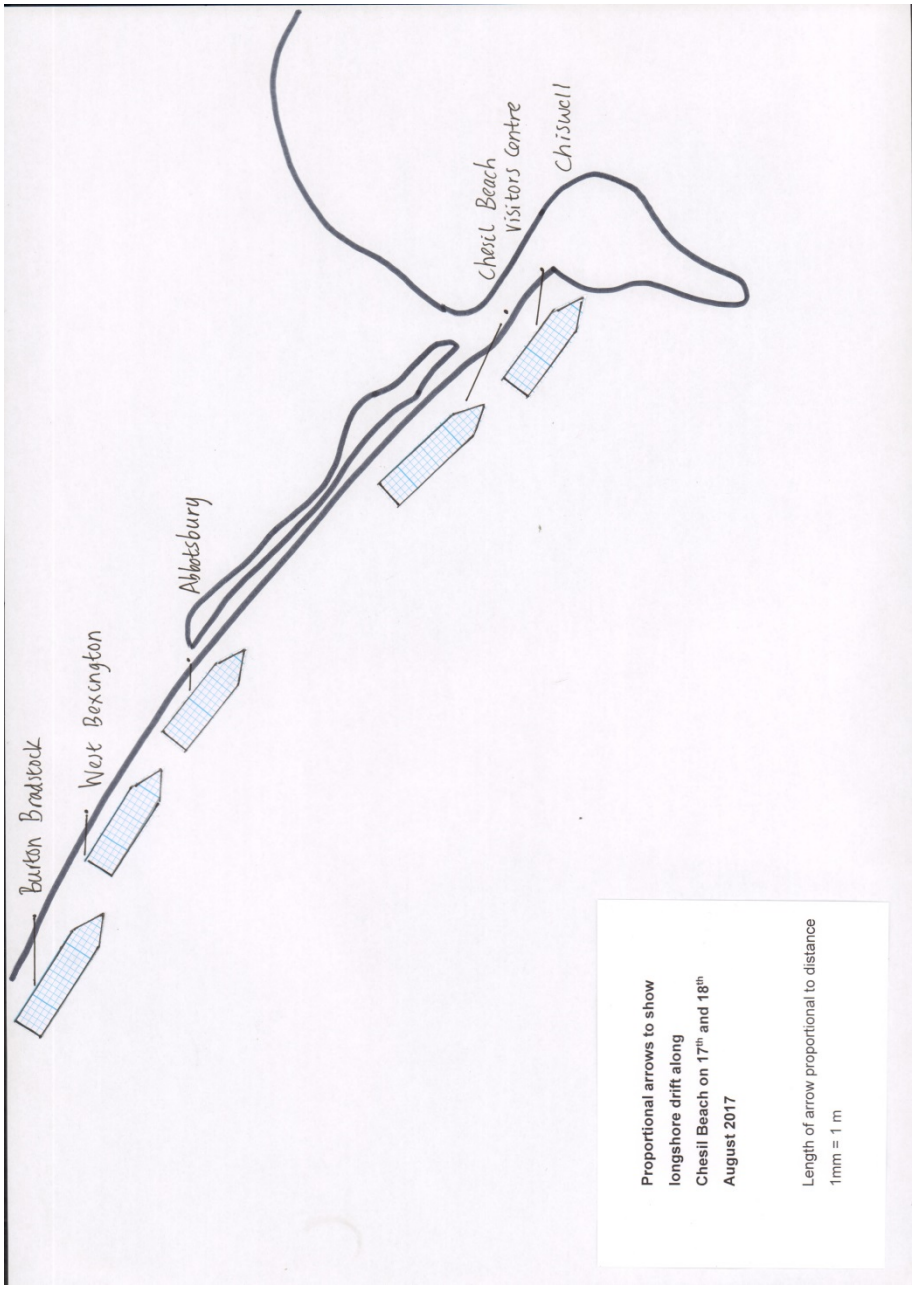
With the wind blowing mainly from the west and southwest this would encourage the formation of waves in this direction and the movement of material along Chesil Beach towards Portland.
The waves observed during our fieldwork were also from the south and southwest and again this would support the idea that the dominant longshore drift direction was generally towards the east. Waves from the west and south west would have come a long way over the Atlantic with a long fetch which would have created large, powerful waves capable of moving material.

Detailed analysis of results with reference to values and data – use of appropriate statistical techniques – area 3a and 3b

Reference to background theory and research – area 3c

Also, these waves can shift and move the pebbles and change the shape of the beach throughout the year. The Chesilbeach.org website suggest that up to 3 million tonnes of beach material can be moved off the beach during really bad storms. After the storms then the waves will carry this rock material back onto the beach.

My measurements for longshore drift showed overall movement in the direction towards Portland with rates varying from 5.4 m/sec to 6.4 m/sec. This supports the idea that this is the most dominant direction and is supported by the wind and wave direction coming from the west and south west on the days that I carried out my fieldwork. This supports the theory that longshore drift is mainly moving the large pebbles in this direction. Ian West (from Southampton University) suggests that Chesil Beach is moving 15cm eastwards at the Portland end which is supported by my data collection.



Clear discussion of hypotheses – use of data to answer geographical questions – area 4c

Conclusion

I set out to investigate three hypotheses as part of my investigation. In conclusion my findings for each hypothesis are:

1. The size of sediment will increase from north-west to south-east along the beach – this will be due to the sorting of the sediment by longshore drift

The data that I collected has certainly shown this with average pebble size increasing from 13 mm to more than 66 mm over the 18-mile length of Chesil Beach. This certainly supports what I have read in my research and is probably as the result of two directions of longshore drift which result in the sorting of beach material along the coast. The pebbles will also have been further reduced in in size by the action of attrition.
Pebbles have been sorted and there is a gradual increase in size from NW to SE along the beach. It is satisfying to have found this as I have proved something that I have read about in books and shows how the fieldwork can help to consolidate my understanding of the theory of geography.
There is also greater variation of size of pebbles at sites four and five rather than sites one, two and three, this could be as a result of the movement of pebbles by longshore drift.

2. The gradient of the beach increase from north-west to south-east – shingle and pebbles beaches tend to have steeper gradients than sandy beaches so I would expect to see the gradient increase as the size of beach material increases

The data collected for this research has supported this idea. There is definitely a greater angle to the beach where the larger pebbles are to be found. Large material makes steeper gradients as the beach material settles with more gaps between the larger pieces whilst smaller pebbles and sand are able to settle more easily with smaller gaps.
In places, the height and width of the beach has also been influenced by the land behind the beach, if there is flat land or cliffs. This shows that landforms on the coast are the result of present day and historic processes but are also influenced strongly be geology and shape of the land.

3. Chesil Beach will be exposed to powerful wind and waves from the south-west – I expect to find that the wind and waves hitting Chesil Beach are very powerful as it is a high energy coast and I expect they will have a big influence on the beach

Even on the summer days that I visited Chesil Beach it was fairly breezy and the beach was definitely exposed to winds from the west. The waves were also very powerful, reflecting their journey across the Atlantic, and were breaking frequently on the beach.

Area 3b – extending existing geographical knowledge

Due to these active wind and waves Chesil Beach is going to be very changeable and the pebbles will be easily removed and replaced under different conditions. The beach profile will be changing all the time.

Clear evaluation of investigation – area 4b

How has this project furthered my understanding?

By carrying out data collection along Chesil Beach I have been able to gain a better understanding of how processes operate in coastal areas and how landforms are created. This has supported my understanding of unit 3.1.3.2 and 3.1.3.3 which cover the processes and landforms of coastal areas.

Evaluation

Methods

Overall, I think that my methods of data collection were reliable as I applied them consistently at each site and I also considered the sampling method that I would use at each site.
The main improvement I would make would be to visit again at various points during the year to see how the landforms and processes vary. This was not possible within the time constrains of this piece of work.
One other improvement would be to use a spirit level to ensure that the tape measure was as level as possible when measuring the profile of the beach.
I could also extend my research of pebble shape by measuring the A, B and C axis and the radius of curvature of each pebble sampled. This would allow me to work out the index of roundness and flatness and also categorise as a blade, disc, sphere or rods. It would also be interesting to see if there was any link between rock type and size or shape of pebble on the beach.

Results

The results that I collected were an accurate and reliable set of results as long as I remember that I only collected this data at one point over two days and so would not accurately reflect variations in the beach over the year and particularly following significant storm events.
In addition, due to the time taken to travel between sites I measured the profiles at slightly different times within the tidal cycle which means that there might be slight variations in the size of profiles.
However, despite these limitations I am confident that I collected a significant amount of data that was reliable and accurate.

Conclusions

I was able to clearly answer my hypotheses based on the data that I collected during this research. This would suggest that my results allowed me to come to sound conclusions.
Obviously, I must remember that this data was collected on only one occasion so there might be variations in wind or waves or beach profiles.
However, the pebble data and conclusions is very reliable as this information is unlikely to change significantly over the year.
The conclusions also supported my research and the background theory which suggests that there is value in the research that I carried out.

Evidence of research and background reading – area 1b

Bibliography

chesilbeach.org

Dorset Wildlife Trust Leaflet – 'The Formation of Chesil Beach'

Ian West Southampton University – various websites

Rgs.org website
wind.willyweather.co.uk/sw/dorset/portland-harbour.html
myweather2.com/City-Town/United-Kingdom/Dorset/Chesil-Beach/climate-profile.aspx

'Process and landform – Conceptual frameworks in Geography' – Clowes and Comfort - 1994 Oliver and Boyd
'Landmark AS Geography' – Prosser, Raw, Bishop and Miller – 2003 Collins

'Advanced Geography '- Nagle – 2000 Garrett

Data collection sheets – evidence of data collection – areas 2a, 2b, 2c

Appendices

1. Data collection sheet

Chesil beach data collection sheet

Location	
Date	
Time	
Weather conditions	

Wind direction	
Wind strength	
Wave direction	
Wave type	
Wave count	
Longshore drift	

Beach profile

Section	Horizontal distance	Vertical distance	Up or down
1			
2			
3			
4			
5			
6			
7			
8			

2. Data collection sheet

Pebble size and shape

Pebble	Size	Shape	Pebble	Size	Shape
1			26		
2			27		
3			28		
4			29		
5			30		
6			31		
7			32		
8			33		
9			34		
10			35		
11			36		
12			37		
13			38		
14			39		
15			40		
16			41		
17			42		
18			43		
19			44		
20			45		
21			46		
22			47		
23			48		
24			49		
25			50		

3. Summary of data

Summary of pebble results

	Mean	Max	Min	Range	WR	R	SR	SA	A
BB	13.62	22	9	13	16	14	12	5	3
WB	17.88	30	9	21	11	20	15	3	1
AB	26.4	66	14	42	4	27	10	9	0
VC	45.48	70	32	38	15	22	13	0	0
CH	67.66	111	36	75	23	14	13	0	0

Evidence of statistical techniques used appropriately and accurately – areas 3a and 3b

Summary of wind and wave data from Chesil Beach

	Wind direction	Wind strength	Wave direction	Wave count	Longshore Drift
Burton Bradstock	Westerly	6.1 m/sec	SW	11 per minute	32 metres in 5 minutes
West Bexington	WSW	5.6 m/sec	S	14 per minute	29 metres in 5 minutes
Abbotsbury	SW	3.5 m/sec	S	14 per minute	27 metres in 5 minutes
Chesil Beach Visitor Centre	WSW	7.9 m/sec	SW	14 per minute	32 metres in 5 minutes
Chiswell	SW	5.5 m/sec	SW	10 per minute	27 metres in 5 minutes

4. Example of Excel spreadsheet for standard deviation

Copy of Excel spreadsheet

Pebble Diameter	Shape	Difference	Square
22	WR	8.38	70.2244
18	WR	4.38	19.1844
18	WR	4.38	19.1844
17	R	3.38	11.4244
17	SR	3.38	11.4244
17	SR	3.38	11.4244
17	SR	3.38	11.4244
17	WR	3.38	11.4244
16	SR	2.38	5.6644
16	SR	2.38	5.6644
16	WR	2.38	5.6644
15	R	1.38	1.9044
15	R	1.38	1.9044
15	SR	1.38	1.9044
15	SR	1.38	1.9044
15	SR	1.38	1.9044
14	R	0.38	0.1444
14	R	0.38	0.1444
14	R	0.38	0.1444
14	R	0.38	0.1444
14	R	0.38	0.1444

14	SR	0.38	0.1444
14	WR	0.38	0.1444
14	WR	0.38	0.1444
14	WR	0.38	0.1444
14	WR	0.38	0.1444
14	WR	0.38	0.1444
13	R	-0.62	0.3844
13	R	-0.62	0.3844
13	WR	-0.62	0.3844
12	A	-1.62	2.6244
12	R	-1.62	2.6244
12	R	-1.62	2.6244
12	SA	-1.62	2.6244
12	SA	-1.62	2.6244
12	WR	-1.62	2.6244
12	WR	-1.62	2.6244
12	WR	-1.62	2.6244
12	WR	-1.62	2.6244
11	A	-2.62	6.8644
11	SA	-2.62	6.8644
11	SA	-2.62	6.8644
11	SR	-2.62	6.8644
11	WR	-2.62	6.8644
10	R	-3.62	13.1044
10	R	-3.62	13.1044
10	SA	-3.62	13.1044
10	SR	-3.62	13.1044
10	SR	-3.62	13.1044
9	A	-4.62	21.3444
13.62		Total	339.78
		Total/n	6.7956

Commentary

How do the characteristics of the beach and sediment vary along Chesil Beach on the Jurassic Coast, Dorset?

Area 1: Introduction and preliminary research (10 marks)

To define the research questions which underpin field investigations. (AO3)

A question is clearly identified on the Proposal form and this is also the title of the investigation.

A number of hypotheses are identified as part of the investigation.

There is reference to the relevant sections of the specifications both within the proposal form and as part of the introduction. Areas of the specification identified as with 3.1.3.2 Systems and Processes and 3.1.3.3 Coastal Landscape Development.

Level 3: a research question is securely identified that is explicitly linked to the specification.

To research relevant literature sources and understand and write up the theoretical or comparative context for a research question. (AO3)

There is reference within the introduction to a variety of books and online sources of material as well as leaflets collected from Dorset Wildlife Trust. These are referred to within the analysis of the results as well. However the sources are not clearly referenced.

Clear location of study site and background on area and formation clear.

Level 3: supported by focused use of relevant literature sources.

Level 3

8 marks

Area 2: Methods of field investigation (15 marks)

To observe and record phenomena in the field and devise and justify practical approaches taken in the field including frequency/ timing of observation, sampling, and data collection approaches. (AO3)

A good range of appropriate techniques identified and justified within context of project. Use of both quantitative and qualitative methods.

Sampling methods also described and justified. Clearly focus on what needed to be collected and why. Limited indications of frequencies and timings for some methods.

Level 4 (low): detailed use of a range of appropriate observational, recoding and other data collection approaches including sampling.

To demonstrate practical knowledge and understanding of field methodologies appropriate to the investigation of human and physical processes. (AO3)

Clear account of methods, their implementation and evaluation shows a sound understanding of what has been carried out.

Level 4: detailed demonstration of practical knowledge and understanding of field methodologies appropriate to the investigation of human and physical processes.

To implement chosen methodologies to collect data/ information of good quality and relevant to the topic under investigation. (AO3)

There is good evidence of a substantial amount of data collected as described and with appropriate methods and sampling. Data collected appropriate to investigating hypotheses.

Level 4: Detailed implementation of chosen methodologies to collect data/ information of good quality and relevant to the topic under investigation.

Level 4

14 marks

Area 3: Methods of critical analysis (20 marks)

To demonstrate knowledge and understanding of the techniques appropriate for analysing field data and information and for representing results and show ability to select suitable quantitative or qualitative approaches and to apply them. (AO3)

Data is clearly presented in a variety of maps, dispersion graphs, proportional symbols and scaled profiles – many of these are geolocated. All are appropriate to the data collected and presented in an accurate way. The data presentation is generally integrated within the analysis section of the investigation, although some techniques are separate.

Statistical analysis including the use of gradients, means and standard deviation are appropriately and accurately used and discussed within analysis. These serve to enhance the discussion of the hypotheses.

Level 4 (low): effective demonstration of knowledge and understanding of the techniques appropriate for analysing field data and information and for representing results.

Thorough ability to select suitable quantitative or qualitative approaches and to apply them.

To demonstrate the ability to interrogate and critically examine field data in order to comment on its accuracy and/or the extent to which it is representative, and use the experience to extend geographical understanding. (AO3)

Data is interpreted in detail with the supporting evidence of statistics where appropriate. Each hypothesis is discussed in detail and referenced to evidence from results. Awareness of limitations within the data in terms of wind and wave conditions and the seasonal variations along the beach.

Some evidence of the work helping to consolidate wider geographical understanding both in the conclusions and the specific section.

Level 3/4: thorough ability to interrogate and critically examine field data in order to comment on its accuracy and/or the extent to which it is representative.

Secure use of experience to extend geographical understanding.

To apply existing knowledge, theory and concepts to order and understand field observations. (AO2)

Makes use of background research to support discussion of ideas within analysis and conclusions. Links made between the fieldwork and theories about Chesil Beach.

Level 4: detailed application of existing knowledge, theory and concepts to order and understand field observations.

Level 4

18 marks

Area 4: Conclusions, evaluation and presentation (15 marks)

To show the ability to write up field results clearly and logically, using a range of presentation methods (AO3 strand 3)

The investigation is clearly and logically written up. There is an appropriate structure to the investigation. A variety of presentation methods are used where appropriate and these enhance the quality of the work.

Level 4: thorough ability to write up field results clearly and logically, using a range of presentation methods.

To evaluate and reflect on fieldwork investigations, explain how the results relate to the wider context and show an understanding of the ethical dimensions of field research (AO3 strand 2)

Limitations of methods are discussed in the methods section and within the conclusions and evaluation. There is an awareness of the limitations of data collected on only a few days and areas for extension clearly identified.

There are some links to the wider context of geography in relation to coastal processes.

Discussion of ethical considerations within the risk assessment and method – use of apples for longshore drift and awareness of other beach users.

Level 3: clear evaluation and reflection on the fieldwork investigation

Some explanation of how the results relate to the wider context.

Clear understanding of the ethical dimensions of field research.

To demonstrate the ability to write a coherent analysis of fieldwork findings in order to answer a specific geographical question and to do this by drawing effectively on evidence and theory to make a well-argued case (AO3 strand 3).

Clear discussion of results to examine each hypothesis and to link fieldwork findings with research and theory.

Level 3: focused ability to write a coherent analysis of fieldwork findings in order to answer a specific geographical question.

Draws explicitly on evidence and theory to make an argued case

Level 3

11 marks

Overall

Area 1: 8
Area 2: 14
Area 3: 18
Area 4: 11

Total: 51

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