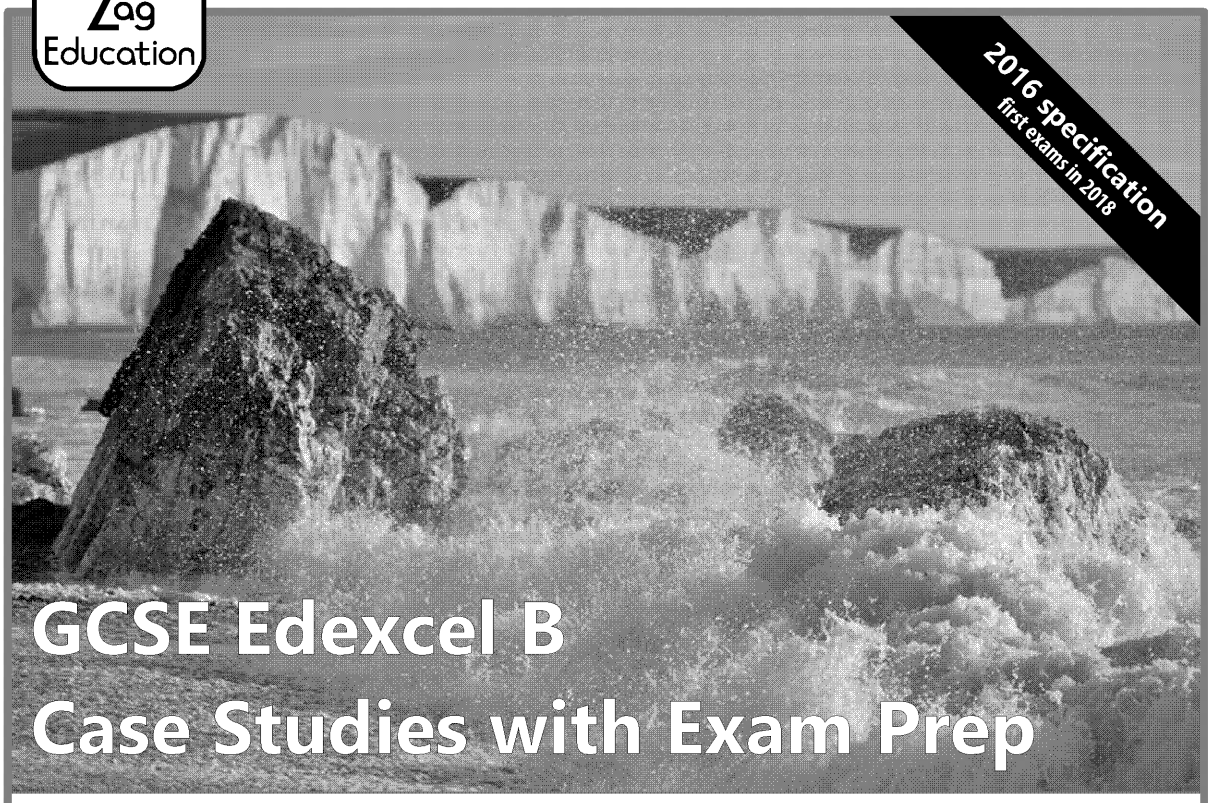
Zig Zag Education

Geography GCSE (9–1) | Edexcel B | 1GB0



GCSE Edexcel B
Case Studies with Exam Prep

Topic 4: The UK's Evolving Physical Landscape: Coastal Change

The Seven Sisters, Sussex

zigzageducation.co.uk

POD 8837

Contents

Teacher's Introduction

This resource has been developed to provide case studies and exam preparation material to support the GCSE Edexcel B specification (1GB0) **Topic 4: The UK's Evolving Physical Landscape**.

This detailed case study is on **The Seven Sisters**, representing a distinctive coastal landscape in the UK.

The case study includes a main content section which can be used as part of a lesson plan or distributed to students for self-guided research; a selection of ICT interactive links to further students' research around each topic and a set of Springboard Images and discussion questions (also available as a PPT file accessible by digital download) which makes a fantastic starter activity.

*A webpage containing all the links listed in this resource is conveniently provided on ZigZag Education's website at **zzed.uk/8837***

You may find this helpful for accessing the websites rather than typing in each URL.

The exam preparation section which follows the case study contains a summary table, bringing together all of the key facts and figures relating to the case study; rapid-fire revision questions (with answers) to help recall and retention of the main points; and an exam-style question and mark scheme, written in the style of the Edexcel B sample material, so that students can practice answering questions relating to case studies and applying relevant knowledge in their answers.

The resource may be used as a source of reference for the required case studies for individual study, or for group work leading to discussion or debate. Subheadings in the information sections are designed to enable tabulated comparisons of social, economic and environmental impacts.

Three other detailed case studies are available for this topic area representing another coastal landscape, and two river landscapes from across the UK:

- The Jurassic Coast
- The River Thames
- The River Spey

A PowerPoint presentation containing the Springboard Images starter activity to accompany this resource is available as a free digital download. Just register for free updates using the link below to download all available content for your school or purchasing site.

November 2018

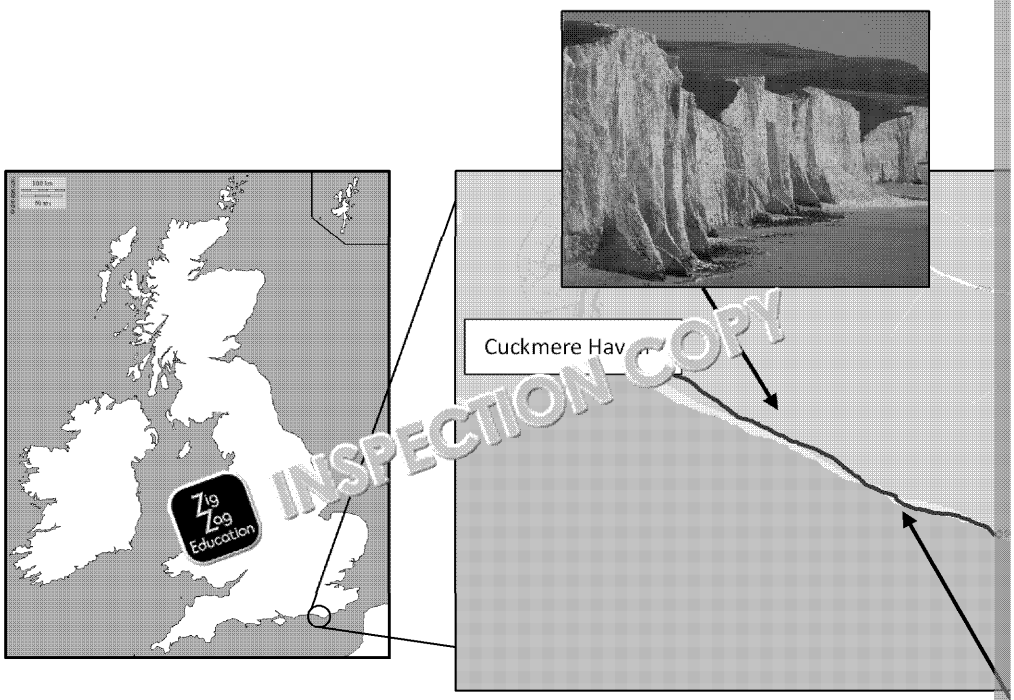
Part 1: Case Study

Content

Introduction

The Seven Sisters is a distinctive section of coastline located in the south-east of Eastbourne and [illegible] in East Sussex. It consists of 280 hectares of white cliffs above sea level. This stretch of coast is part of the South Downs National Park, Country Park and is owned by the National Trust, showing its national importance coastline.

Figure 1: Seven Sisters from Cuckmere Haven



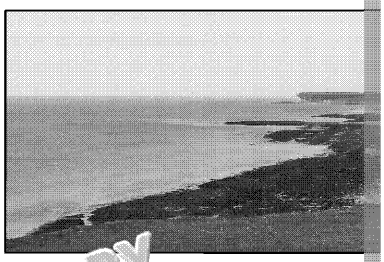


Figure 2: Seven Sisters cliffs

The coastline is particularly special due to its unique geology, biology and history. The chalk cliffs are home to fossils from creatures that inhabited the earth millions of years ago. Nowadays, the cliffs and surrounding area create many rare habitats for animals, such as for seagulls and rock pools for crabs and anemones. The area has also been significant in human history and there is evidence of human activity and settlements from the Stone Age to the Second World War. These features, as well as the untouched beauty of the area, attract thousands of visitors each year.

The cliffs are aptly called the Seven Sisters because there are seven cliffs. Ea
shown in the photo below.

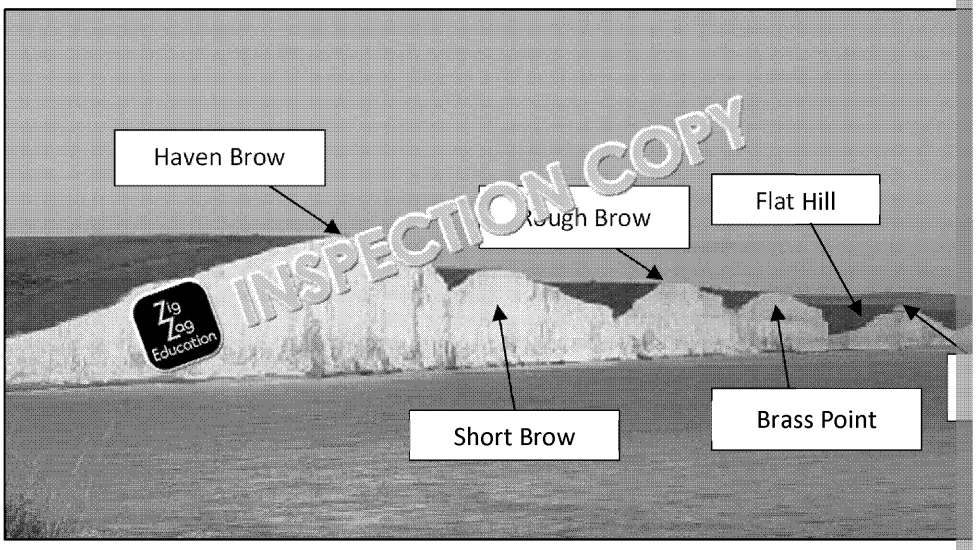


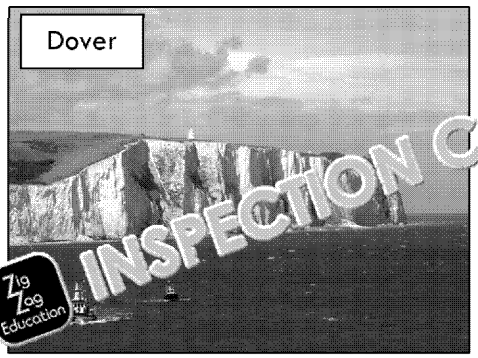
Figure 3: The names of the Seven Sisters

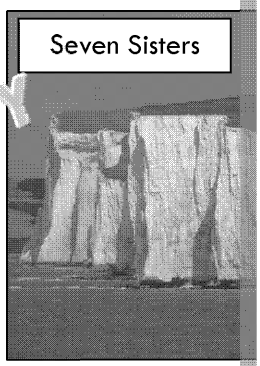
These iconic cliffs were formed millions of years ago during the time perio
Cretaceous. At this time, the continents looked completely different to how
the sea level was around 200 metres higher. The Seven Sisters chalk was fo
build-up of sea creature skeletons on the ocean floor. Over time, the climat
continents shifted in such a way that the chalk has ended up on the coast o

The wave-like shape of the cliffs show that they are the remains of a dry va
formed when the glaciers were melting at the end of the last ice age. Due to
soaks up water until it reaches full capacity. When the glaciers were meltin
capacity, full of fresh water. This meant that the meltwater could not be s
instead flowed over the land carving out valleys in the chalk. When the cli
disappeared, leaving behind the dry valley which we can see today.

Did you know?

Despite both being chalk cliffs, the Seven Sisters are actually whiter tha
Dover. Because of this, the Seven Sisters are sometimes used in films as
famous cliffs of Dover!





Landforms

The Seven Sisters coastline is home to some interesting coastal landforms. These landforms are mainly formed through erosional processes, such as hydraulic action and abrasion, as well as weathering.

The Seven Sisters are actually retreating at a rate of 50–60 centimetres per year due to the high amount of erosion taking place. This erosion keeps the cliffs white as fresh chalk is constantly being exposed.

Evidence of this erosion can be seen through a row of houses at Birling Gap, which lies at the eastern end of the Seven Sisters. The first photo was taken in 1987 and the second in 2015.

How weat

Physical weather
- As chalk is p
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Chemical weatheri
- Chalk is also
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causes a chem
soluble substa

Biological weatherin
- A little sea cre
known to create
spinning its shell
tunnels and wea

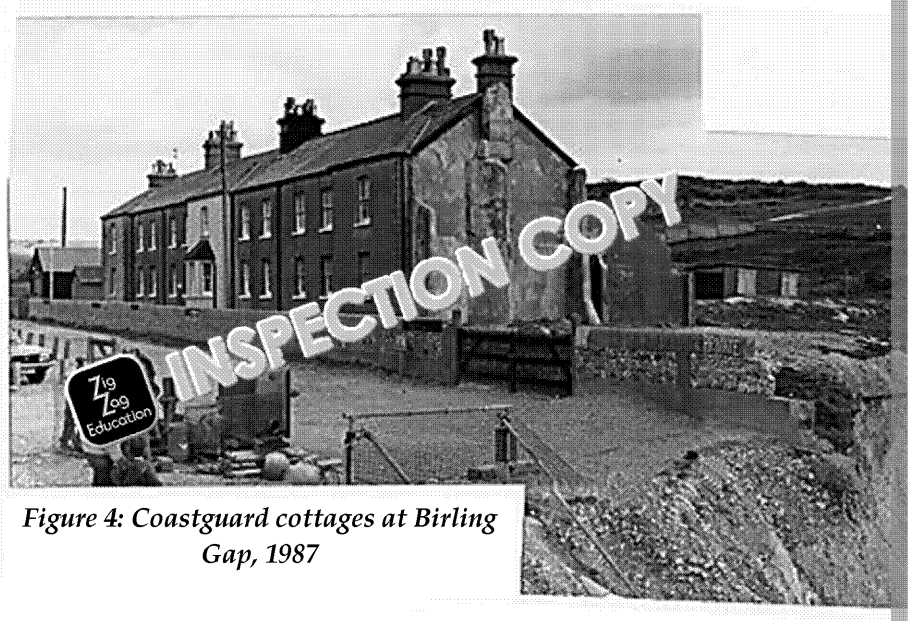

Figure 4: Coastguard cottages at Birling Gap, 1987

Figure 5: Coastguard cottages at Birling Gap, 2015

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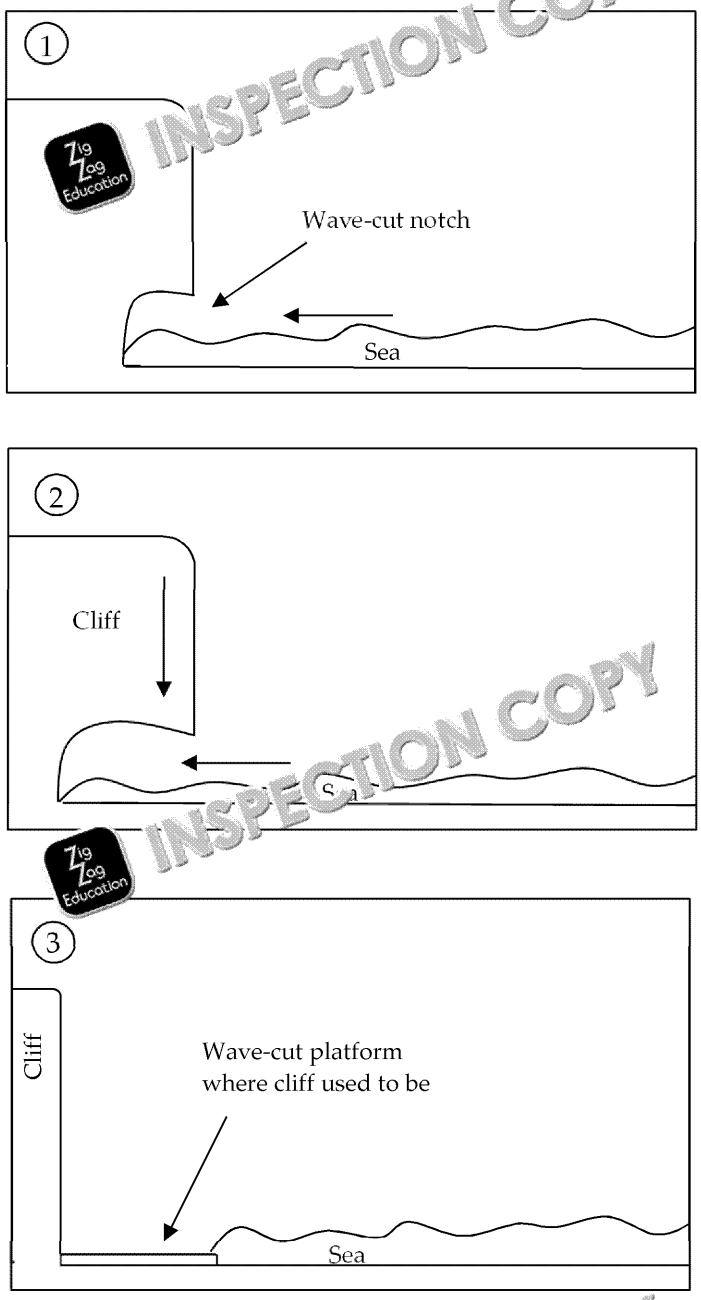
yea
cott

Wave-cut platforms

Wave-cut platforms are one type of landform that can be found at the Seve
are formed through the erosional processes of hydraulic action, abrasion a

The formation of a wave-cut platform



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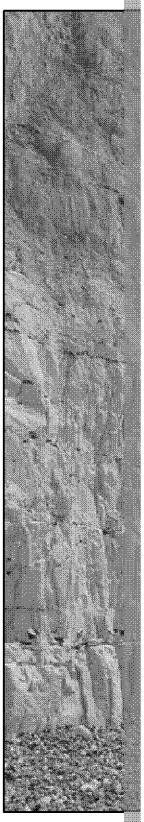
The wave-cut platform at Seven Sisters stretches 540 metres out to sea, reve
cliffs have been lost to erosion over time. The platform at Seven Sisters is n
has led to the formation of rock pools. These rock pools provide important
creatures as well as an attraction for visitors. When the cliffs collapse they a
material to look for fossils in.

Figure 6: Cliff collapse



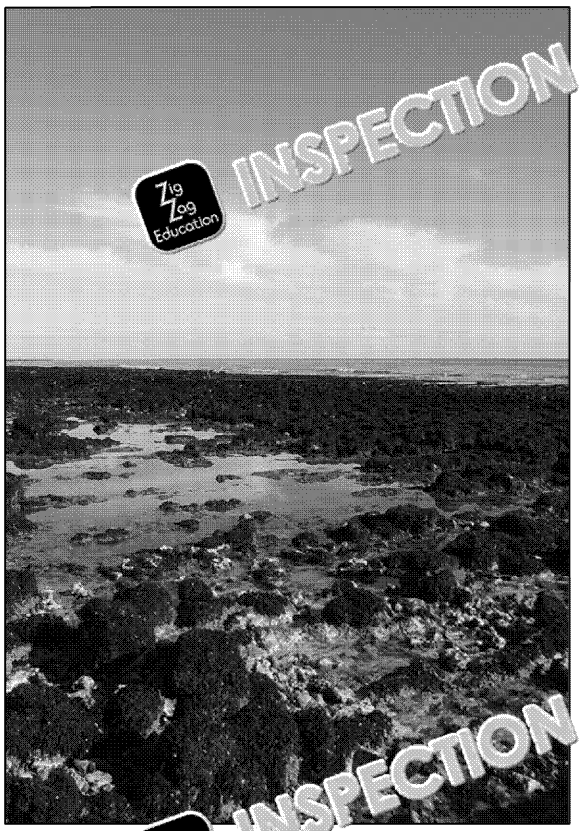


Figure 8: R ols on the wave-cut platform

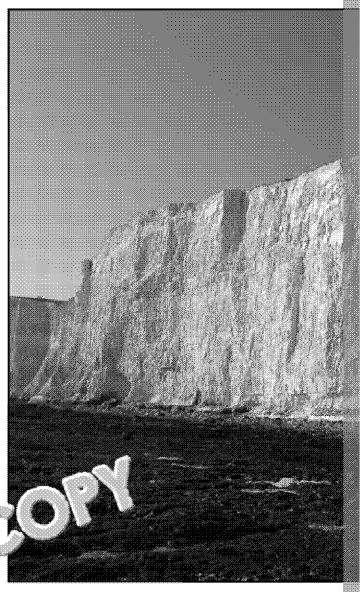


Figure 9: W

Other erosional landforms that can be found at the Seven Sisters cliffs are c
stumps. However, they are often quite small and disappear fairly quickly d

Caves

The Seven Sisters cliffs are home to many small caves where the bottom of
by wave action forming a hollowed-out cave.

Figure 10: Small caves at Seven Sisters

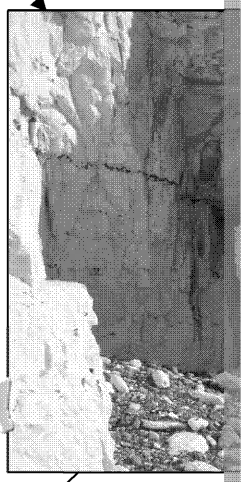


Figure 11:

Arches

Some caves continue to be eroded by the sea
they erode through to the other side
forming an arch.

Figure 12: Stumps at Seven S

Stacks and stumps

Eventually these a
to erosional proces
which slowly erod

Physical influences on the Seven Sisters

Although the shape of the Seven Sisters coastline has mainly been formed t
processes there are other physical factors that influence the effectiveness of
both geology and climate have a role to play in shaping the coastline.

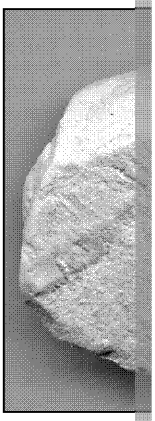
Geology

The beautiful white chalk at Seven Sisters is partly what makes the cliffs so
also plays a significant role in creating the shape of the landscape.

Chalk is resistant enough to create the steep cliffs that the Seven Sisters are
also soft enough to erode quite easily, keeping the cliffs their notable white
chalk are will help to create the unique and distinctive landscape of the Se

Chalk Profile

Type:	Sedimentary limestone
Age:	60–100 million years old
Resistance:	Medium resistance, harder than clays but more easily eroded than other limestones or granite
Human uses:	Blackboard chalks Chalk for sports such as gymnastics Making stone to build houses



Figu

The geology at *Birling Gap* cliff is a bit different to that of the chalk cliffs. It
rock so the cliffs here are eroding at a faster rate than the Seven Sisters cliffs
small bay.

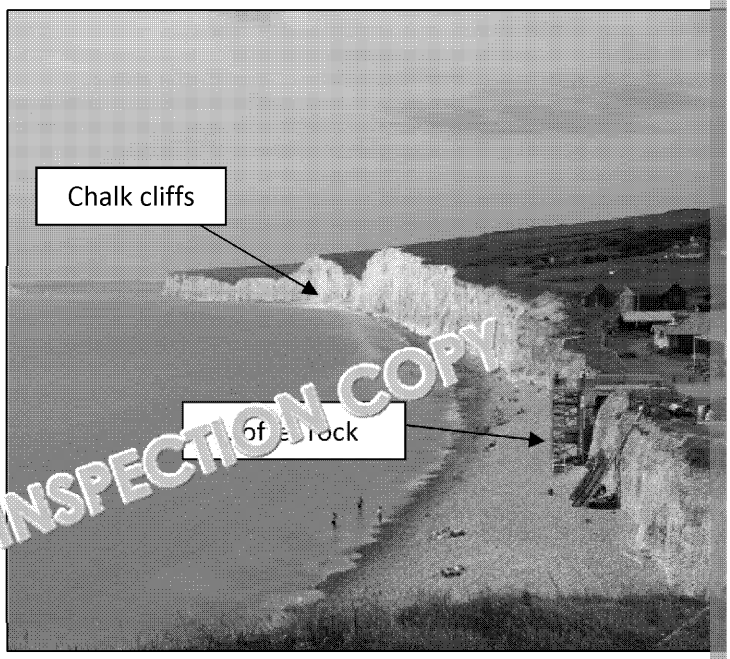


Figure 14: Birling Gap has a slightly different geology to the

Climate

Climate also has a role to play in the shape of the cliffs and the effectiveness

Most winters, a number of storms hit the UK. The heavy rainfall and strong impact on shaping the Seven Sisters cliffs. The most recent and significant e storms of 2013/14.

The 2013/14 winter storms

The winter storms of 2013/14 was the ... period for 20 years with twelve s quick succession, over the period of ... ber to February. Coastlines were partic Seven Sisters saw seven ... m of erosion in just two months!

Figure 15: Photos depicting the damage of the winter storm

As you can see in the before and after photos above, the storms caused rapid er changed the shape of the coastline. The stairway down to the beach from the Nat of cliff from underneath it. You can also see that the houses are now considerably

The aftermath of the winter storms were a shock to the National Trust. They had to parlour and sun loungers on their property as well as demolish the coastguard cot

Climate change is a factor that will have considerable effects on the shape There are two main ways that this may occur:

1. *Sea level rise*
   An increase in sea level will increase the e... power of the sea and t even faster rate. This could also ... re coastal flooding and the loss
2. *More frequent storm*
   Expert ... al... ggesting that the UK will be subject to more storms particu... worrisome for areas of the coast that are already badly affe Seven Sisters. Storms are unpredictable and can rapidly change the sha the winter storms of 2013/14. More storms will only mean more damag disappear at a faster rate than expected.

Human influences on the Seven Sisters

Humans have also had an impact on the Seven Sisters coastline. Evidence f
Sisters shows that humans have used the area throughout human history f
the timeline below.

Historical influence

Neolithic (New Stone Age): 5,000 y ago

A circular enclo s a site above Birling t d es back around 5,000 years bu still not known what it would

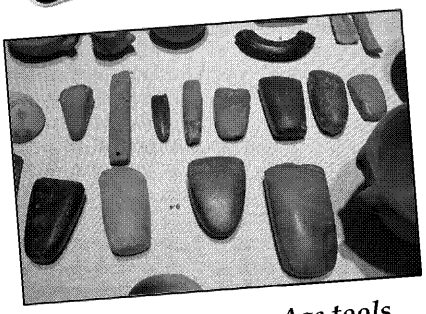


Figure 16: Bronze Age tools

The Bronze Ag

There is eviden site on Bailys H

The Normans: AD 1066–1154

On top of Bailey Hill evidence has been found of farming taking place on the hill around th time of the Normans. They've found u old tools as well as pieces of

Coonatto shipw

A cargo ship ca washed ashore The wreck of th tide!

Smugglers: eighteenth and nineteenth centuries

Evidence suggests that the Seven Sisters were a popular place for smugglers. Excavations of an old coastguard cabin show it was used to stop smugglers. Half of the site has now been

Figure 18: World War II coastal defences

World War II: 1

The cliffs were an airfield. Coa around the cliff incoming invas

There is plenty of evidence from the past of how humans have used the Se
farming to coastal defences and smuggling. But how are humans influenci

Coastal management

The main way is through coastal management. This can take many forms, from hard management such as sea walls and groynes to soft management such as beach replenishment.

Why might huma coastline?

- To preserve the
- To protect the i villages near the
- To protect huma coastal erosion c

As the Seven Sisters sea [illegible] coastline is owned by the Nation[illegible]st [illegible]ey are in charge of deciding the best way to [illegible]ge it.

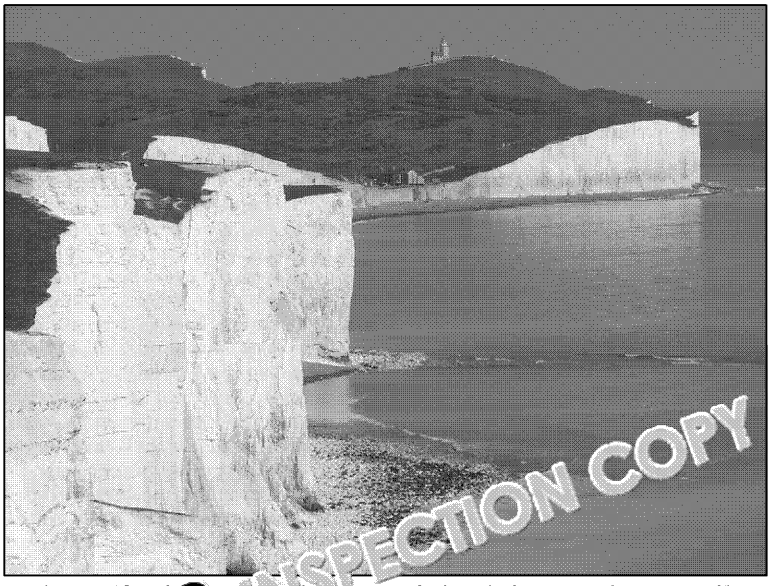


Figure 19: [illegible]ers are being left to erode naturally

Since 2005, the [illegible] championed t[illegible] to our changi[illegible] adapt the coas[illegible] spending mo[illegible] sea walls or g[illegible] temporary fix[illegible] engineering n[illegible] regularly.

The impact th[illegible] on the UK coa[illegible] extremely rap[illegible] occurred at Se[illegible] proved just h[illegible] manage the co[illegible]

On top of this, the National Trust are thinking ahead to the future and the [illegible] climate change.

For these reasons, the National Trust decided to implement a 'managed retreat' scheme at Seven Sisters. Essentially, this means letting the coast erode completely naturally and gradually moving coastal buildings and infrastructures back as the coast retreats. This way they are adapting to the changing coastline rather than attempting to manage it.

The National Trust Cent[illegible]g Gap has been plann[illegible]d [illegible] such a way that it will easily [illegible] to be moved back over time.

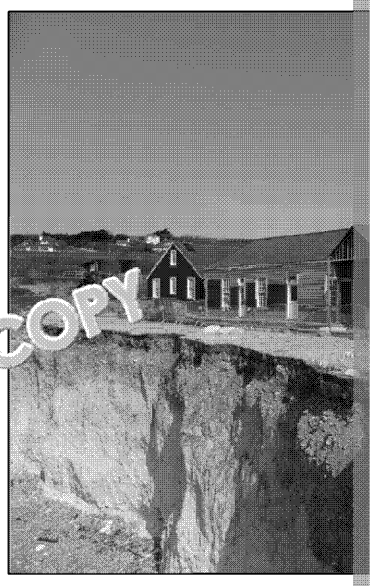


Figure 20: Erosion by Nati[illegible]

Advantages of the Seven Sisters managed retreat:

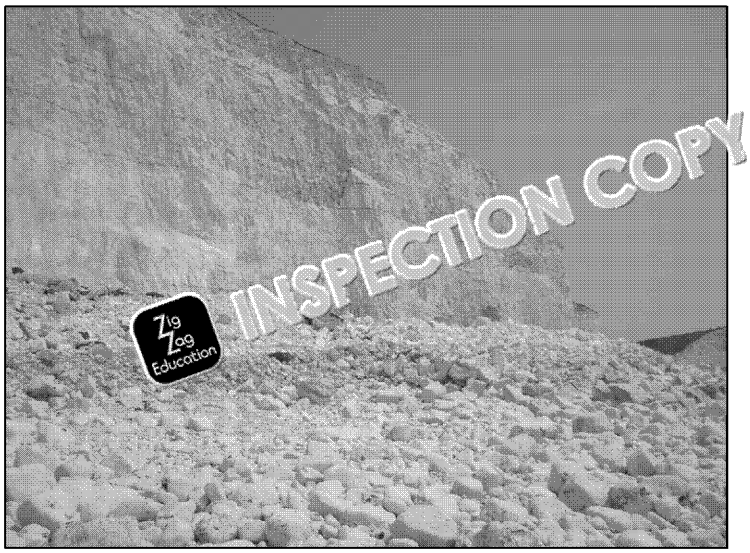


Figure 21: Natural erosion of the Seven Sisters cliffs

+ Lack of any
cliffs and th
natural form

+ Managed re
engineering.

+ It is a more
the coastline
have to cont
engineering

+ Keeps the ic
erosion is a

Disadvantages of the Seven Sisters managed retreat:

- Difficult for people who live in the area as nothing is being done to protect their property.
- If hard engineering had been in place, some damage from the winter storms 13/14 could have been prevented.
- Gradual loss of the chalk cliffs, habitats, infrastructure and archaeological history.
- There is no protection on the cliffs and this can be dangerous for people as landslides are frequent occurrences.

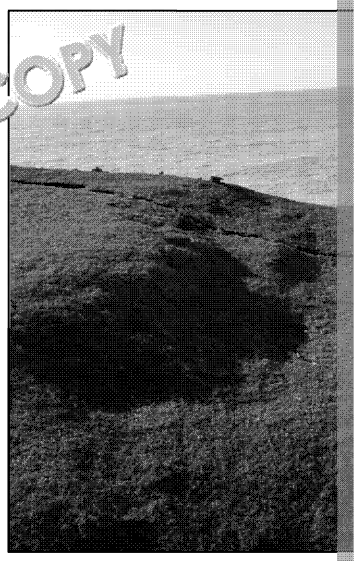


Figure 22: Crack at the edge

Fact Table

Location:	East Sussex, south east of the UK
Size:	280 hectares
Height:	80 metres abo[illegible] level
Rock type:	Chal[illegible]
Age of rock:	[illegible]–100 million years old
Resistance level of rock:	Medium
Land owner:	National Trust
Land part of:	South Downs National Park Seven Sisters Country Park
Names of the Seven Sisters:	Haven Brow, Short Brow, Rough Brow, Hill, Went Hill
Sea level during the Upper Cretaceous:	200 metres higher than today
Geomorphic processes:	Erosion (hydraulic action, abrasion, att Weathering (physical, chemical and bio
Rate of cliff retreat:	50–60 centimetres per year
Landforms:	Wave-cut notch Wave-cut platfor Caves, ar[illegible]s[illegible]acks and stumps
Length of wave-cut platform:	[illegible]0 [illegible]etres
Physical influences on the Seven Sis[illegible]:	Geology (rock type) Climate (storms and climate change)
Recent da[illegible]g storms:	Winter storms 2013/14
Amount of erosion during those storms:	Seven years' worth in two months
Climate change factors:	Sea level rise and more frequent storms
Human influences on the Seven Sisters:	Historical influence from Neolithic tim Coastal management
National Trust's coastal management plan:	Managed retreat, let natural erosion oc

ICT Interactive Page

Rather than type out these we

Videos

National Trust Shifting Shores Coastal Management Plan
- **https://www.youtube.com/watch?v=4UOWx9[illegible]Q**

National Trust Birling Gap and S[illegible] Management
- **https://www.youtub[illegible]/watch?v=ZXAgtVj_weA&t=29s**

Sky News [illegible]stal Erosion after winter storms 2013/14
- **https://[illegible]w.youtube.com/watch?v=q3hSyskZXhw**

Seven Sisters Cliff Collapse
- **http://www.bbc.co.uk/newsround/26450371**

Archaeology at Seven Sisters
- **https://www.youtube.com/watch?v=I7UY_mfz-GQ**

News Stories

BBC – Birling Gap Cottages lost to the sea
- **http://www.bbc.co.uk/news/uk-england-sussex-1[illegible]51995**

BBC- Winter Storms at Seven Sisters 201[illegible]
- **http://www.bbc.co.uk/n[illegible]s/u[illegible]gland-sussex-26386499**

The Guard[illegible] Cl[illegible]ate Change at Birling Gap
- **https:/[illegible].theguardian.com/environment/2018/feb/07/floods-erosi[illegible] significant-sites-climate-change**

Reports

National Trust Shifting Shores Report
- **https://www.nationaltrust.org.uk/documents/shifting-shores-report-2**

Springboards

Springboard 1

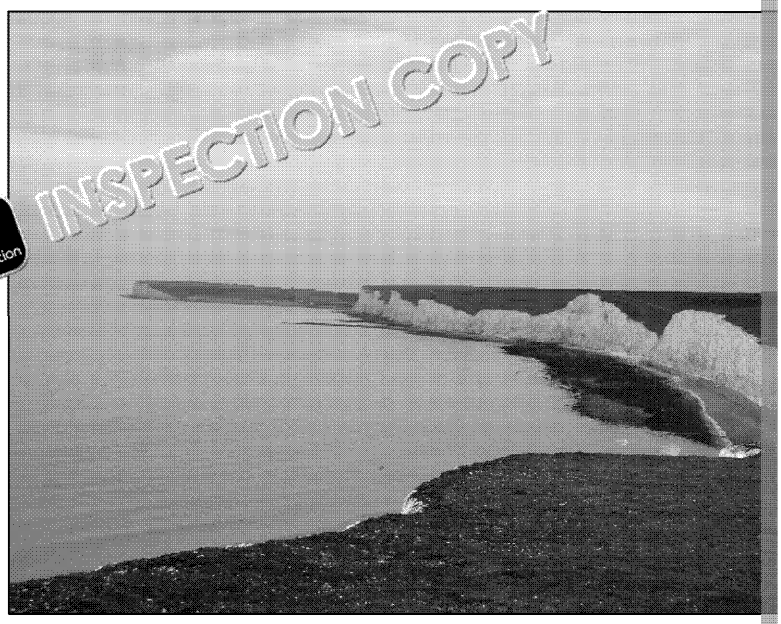


Figure 23: View of the Seven Sisters

1. What is distinctive about this coastline?
2. What features and landforms can you see in this picture?
3. Why might this area be an attractive tourist destination?

Springboard 2

Figure 24: View of wave-cut platform from above

1. What does this image suggest about erosional processes along the Seven
2. How was the wave cut-platform formed?
3. What other features has the wave-cut platform at the Seven Sisters created important?

Springboard 3

Figure 25: Cracks in the cliff at Seven Sisters

1. How might the crack in the cliff have formed?
2. Suggest some negative consequences of the cliff cracking.
3. Suggest some positive consequences of the cliff cracking.

Springboard 4

Figure 26: Birling Gap in the 1920s

1. What does this image tell us about what the Seven Sisters were like a h
2. How much of the coastline that can be seen in this picture is now gone
3. What might the coastline look like in a hundred years from today?

Figure 27: Birling Gap

1. What does this image show?
2. What effects might the managed retreat at Seven Sisters have on the lo
3. Discuss the advantages and disadvantages of managed retreat.

Springboard Suggested Answers

Springboard 1

1	• White chalk cliffs • Steep cliffs • No development • Natural landscape
2	• Steep cliffs • Wave-cut platform • Hanging valley remnants • Any other valid point(s)
3	• Beautiful natural landscape • Archaeological history • Fossil hunting • Walking • Rock pooling

Springboard 2

1	• That erosion is happening at a fast rate • Can see evidence of it in the wave-cut platform on the shore • The cliff is also steep and the edge looks like it's falling away so processes are working on this coastline
2	• The wave-cut platform was formed through erosional process • First the waves erode a wave-cut notch through hydraulic action • Gradually this notch gets deeper until the cliff overhang collapses • The sediment is washed back into the ocean • A wave-cut platform forms where the cliff used to be
3	Rock pools These are important because they provide habitats for various sea creatures to come and explore and learn about some of the wildlife at Seven

Springboard 3

1	• The crack in the cliff has formed through erosion and weathering • Most likely water has seeped into the chalk and caused the rock • This has then caused cracks in the cliff
2	• Could cause a landslide which is dangerous • Loss of cliffs • Could be a habitat for wildlife • Buildings near the cliff will have to be moved • Any other valid point(s)
3	• Fresh cliff fall keeps the cliffs the unique white colour • It's just letting the natural process of erosion occur keeping the • Any other valid point(s)

Springboard 4

1	• There was a considerable more amount of land along the coast • It was used for human settlement • Still not loads of development on the land so still natural coast • There used to be a whole other building nearer to the coast tha
2	Today, there are only three coastguard cottages remaining from th The picture shows the row of coastguard cottages to be a consider edge. The other building that was nearer the cliff has gone, as have t are lying down. The picture is also no longer there.
3	• The coastline will continue to have eroded at a fast rate • It may be faster than the last hundred years due to climate cha • The coastguard cottages will have gone and the National Trus may have been moved even further back

Springboard 5

1	The image shows one of the coastguard cottages being demolished edge of the cliff. Demolishing the house is a form of managed retr
2	• Loss of history of the site • They may have to move • Loss of property • Loss of coastline
3	*Advantages*: • Sustainable • Most natural way of managing the coast • Cheaper *Disadvantages*: • Loss of coastline and its history • Conflict with locals • Loss of habitats for wildlife

Summary

Seven Sisters

Introduction

- The Seven Sisters is a distinctive section of coastline situated in East Sussex
- It consists of 280 hectares of white chalk cliffs that rise 80 metres above sea
- The coast is part of the South Downs National Park and the Seven Sisters Country Park
- They are named the Seven Sisters because there are seven cliffs.
- The cliffs and surrounding area create many rare habitats for wildlife.

Formation

- The chalk was formed during the Upper Cretaceous Period (60–100 million
- was 200 metres higher than it is today.
- Chalk is formed underwater through the build-up of dead sea creatures o
- The cliffs are the remains of a dry valley which would have formed at the
- At this point the chalk would have been saturated with ice so the meltwater
- Instead, the meltwater flowed over the land and carved out a valley.
- When the climate warmed the water disappeared leaving behind the dry

Landforms

- The Seven Sisters are affected by the processes of erosion and weathering.
- The cliffs are retreating at a rate of 50–60 centimetres each year due to this
- This power of erosion can be seen at Birling Gap to the east of the Seven S
- by the cliff edge are gradually being undermined as more and more of the
- This erosion also forms many distinctive landforms.
- The Seven Sisters is home to a large wave-cut platform created by the sea's
- Caves, arches and stumps can also be found there although they er

Physical influences on the Seven Sisters

- Both geology and climate are other physical factors that can influence the
- The fact that the Seven Sisters are made of chalk gives them their distinctive ste
- Chalk is a resistant enough rock that the steep cliffs will form but is soft er
- Climate also influences the effectiveness of weathering and erosion.
- Storms can rapidly change the shape of the coastline.
- The Seven Sisters experienced seven years' worth of erosion in just two m
- of 2013/14.
- Climate change may also have an effect on the coastline in the future with
- and more frequent storms.

Human influences on the Seven Sisters

- Humans have been influencing and using the Seven Sisters coastline since
- years ago.
- There is evidence that the area had been used as a burial site during the Br
- during the eighteenth and nineteenth centuries and as an airfield during W
- Nowadays the area is popular for people to come and enjoy the countryside
- Humans also influence the coastline through coastal management.
- The area is owned by the National Trust and they have decided it should
- erode naturally and simply managing the retreat of property and infrastru
- This is a sustainable way of managing the coastline that allows for adapta
- changes of the future.
- However, it does mean there is a substantial loss of coastline, people's ho
- archaeological history.

Seven Sisters Quick-fire Ques[illegible]

1	Where is [illegible] coastline situated?	
2	How many hectares do the Seven Sisters cover?	
3	How tall are the Seven Sisters?	
4	Which parks do the Seven Sisters belong to?	
5	Who owns the land that the Seven Sisters are on	
6	Name two of the Seven Si[illegible]lifs.	
7	What ti[illegible]od was the chalk of the Seven Sisters made in?	
8	How much higher was the sea level during this time period?	
9	At what rate are the Seven Sisters retreating each year?	
10	How many coastguard cottages at Birling Ga[illegible]day?	
11	What feature forms bef[illegible]cut platform?	
12	How fa[illegible]he [illegible]ave-cut platform at the Seven Sisters reach out to se[illegible]	

13	What other landforms (apart from a wave-cut platform) can be found at the Seven Sisters?	
14	What type of rock is chalk?	
15	How old is chalk?	
16	How resistant is chalk to erosion?	
17	Is the rock at Birling Gap softer or harder than the chalk cliffs?	
18	How much of the Seven Sisters coastline eroded during the winter storms of 2013/14?	
19	Name two consequences of climate change that may affect the Seven Sisters.	
20	In what year did the Coonatto shipwreck happen?	
21	What other human activities have the Seven Sisters been used for in the past?	
22	What type of coastal management is being implemented at the Seven Sisters?	
23	What does this type of management involve?	
24	Name one advantage of this type of management.	
25	Name one disadvantage of this type of management.	

Seven Sisters Quick-fire Answers

1	Where is the Seven Sisters coastline situated?	*East Sussex, between the to*
2	How many hectares does the Seven Sisters cover?	*280 hectares*
3	How tall are the Seven Sisters?	*Around 80 metres high (abo*
4	Which parks do the Seven Sisters belong to?	*The South Downs National* *The Seven Sisters Country*
5	Who owns the land that the Seven Sisters are on?	*The National Trust*
6	Name two of the Seven Sisters cliffs.	*Any of the following:* • *Haven Brow* • *Short Brow* • *Rough Brow* • *Brass Point* • *Flat Hill* • *Bailys Hill* • *Went Hill*
7	What time period was the chalk of the Seven Sisters made in?	*The Upper Cretaceous*
8	How much higher was the sea level during this time period?	*200 metres higher than toda*
9	At what rate are the Seven Sisters retreating each year?	*50–60 centimetres*
10	How many coastguard cottages at Birling Gap are left today?	*Three*
11	What feature forms before a wave-cut platform?	*A wave-cut notch*
12	How far does the wave-cut platform at the Seven Sisters reach out to sea?	*540 metres*
13	What other landforms (apart from a wave-cut platform) can be found at the Seven Sisters?	*Caves* *Arches* *Stacks and stumps*
14	What type of rock is chalk?	*Sedimentary limestone*
15	How old is chalk?	*80–100 million years old*

16	How resistant is chalk to erosion?	*It has a medium level of resistance – harder than clay but much softer than granite, for example*
17	Is the rock at Birling Gap softer or harder than the chalk cliffs?	*Softer*
18	How much of the Seven Sisters coastline eroded during the winter storms of 2013/14?	*Seven years' worth in two months*
19	Name two consequences of climate change that [illegible] the Seven Sisters.	*Sea level rise* *More frequent storms*
20	In what year did the Coonatto [illegible] happen?	*1876*
21	What other human activities have the Seven Sisters been used for in the past?	• *Neolithic enclosures* • *Bronze Age burial sites* • *Farming through Norman times* • *Smuggling* • *World War II airfield and coastal*
22	What type of coastal management is being implemented at the Seven Sisters?	*Managed retreat*
23	What does this type of management involve?	*It means letting the coast erode natura[illegible] back – it is adapting to the ch*
24	Name one advantage of this type of management.	*Any of the following:* • *Keeps the cliffs as natural as possi* • *It's cheaper than hard engineering* • *Sustainable* • *Keeps the cliffs white*
25	Name one disadvantage of this type of management.	*Any of the following:* • *Loss of coastline* • *Loss of property* • *Cliffs are dangerous for people to* • *Conflict with local people as their*

Seven Sisters Extension Questions

1. Explain how the chalk found at the Seven Sisters was formed.
2. Explain how weathering and erosion affect the Seven Sisters.
3. Describe the formation of a cave, arch to a stump.
4. Suggest how the properties of chalk influence the shape of the Seven Si
5. In what ways did the winter storms of 2013/14 affect the Seven Sisters?
6. Discuss the consequences of climate change on the Seven Sisters coastli
7. Describe how humans have used the Seven Sisters coastline throughou
8. Suggest why managed retreat was the chosen management plan for th
9. Examine the consequences of this form of coastal management on the S
10. Evaluate whether hard management would have been the better optio coastline.

Extension Answers

1. The chalk found at the Seven Sisters was formed millions of years ago during
when the sea level was 200 metres higher than it is today.
The chalk was formed underwater through the build-up of the remains of sea

2. **Weathering:**
   - Chalk is porous so rain can flow into the rock and weaken it.
   - If the water freezes it expands and can weaken and crack the rock furthe
   - Rain is slightly acidic. Chalk is highly affected by the acidity and w
   ra r compared to other rocks.
   - Th mmon Piddock also weakens the rock by boring holes into it and,

   Erosion:
   The sea also causes the cliff to weaken and crack through hydraulic action, ab

3. Caves form through hydraulic action, abrasion and solution weakening the bo
The weaker areas of rock are gradually eroded away forming a hollow cave.
Over time the cave continues to erode creating deeper caves. Some erode right
arch.
Eventually these arches collapse as they give in to erosion.
This leaves behind stacks which are eventually eroded down to stumps.

4. Chalk is a fairly soft rock with medium resistance to erosion. This creates the
Seven Sisters. However, it is not as hard as other lim e rocks which mean
geomorphic processes.
Chalk is also porous, so it absorbs w ring it is even more prone to we
The process of erosion keeps the Seven Sisters white. It also helps to create so
wave-cut platform

5. The wi rms of 2013/14 affected the Seven Sisters by:
   - Rapidly eroding areas of the cliff (seven years' worth in two months!).
   - This meant that one of the coastguard cottages and part of the National T
   - Caused landslides along the coastline.
   - Any other valid point(s).

6. Consequences of climate change on the Seven Sisters:
   - Sea level rise could increase the erosional power of the sea increasing the
   - More frequent storms could also increase the rate of erosion on the coast
   - The erosion from the storms could also be unpredictable and hard to pro
   - Summers could be warmer which may increase the visitor numbers to th
   money but could also increase any environmental damage humans can b

7. Humans have been using the Seven Sisters co ne r thousands of years:
   - During Neolithic times (5,000 y) a circular enclosure was built ne
   - During the Bronze Ag s rial site.
   - During the No t was used for farming.
   - It so mon place for smuggling during the eighteenth and nin
   - U ing World War II as an airfield as well as an area of coastal defe
   - Today it is a National Trust area, visited by walkers and sightseers.

8. Managed retreat may have been chosen for the Seven Sisters because:
   - It's a sustainable form of management.
   - The rate of erosion is so fast that it may not be worth it to try and stop it.
   - The rate of erosion is only going to get worse with climate change.
   - It's the most natural form of management.
   - It's cheaper than hard management.

9. Consequences of managed retreat:
   - Loss of coastline.
   - Loss of history.
   - Loss of some wildlife habitats.
   - There may be conflict with some locals as their properties are not being p
   - Coastline will also stay looking natural and beautiful.
   - It will also stay undeveloped, keeping it pristine and the cliffs white.

10. Positives of hard management at the Seven Sisters:
   - Wouldn't cause as drastic a loss of coastline, history and wildlife habitats
   - Would protect the property and homes of local people.
   - Would allow people to enjoy the coastline as it is for longer.
   - Any other valid point(s).

   Negatives of hard management at the Seven Sisters:
   - Expensive.
   - Would make the area look more developed and ruin the natural look.
   - Is not as sustainable and would need constant upkeep.
   - Any other valid point(s).

Exam-style Question

Figure 1: A small cave and a wave-cut notch along the Seven

Using Figure 1 to help you, assess the extent to which the p deposition help to shape coastlines.

Level Marking

Level	Mark	Description
1	1–3	• The student evidences limited understandin exist between places, environments and pro • A limited ability to evaluate is evidenced thro knowledge and understanding. The argumer There is little evidence to support the conclu
2	4–6	• The student evidences good understanding between places, environments and processe • A reasonable ability to evaluate is evidenced application of knowledge and understanding unbalanced and only partially logical. There the conclusions. (AO3)
3	7–8	• The student evidences a firm understanding between places, environments and processe • A strong ability to evaluate is evidenced thro knowledge and understanding. The argumer well explored. There is consistent evidence t (AO3)

Indicative Content

- Students should offer an assessment of the extent to which erosion an coastlines, including coastal landforms.
- They may use specific examples of how erosion and deposition have s
- Allow the assessment of erosion and deposition that go beyond Figure
- Other factors that shape coastlines need to be considered; for example weathering and human activity.
- The student should clearly demonstrate an assessment through consid various factors have on shaping a coastline. They must consider to wh deposition have more effect than the other factors. Lower-level marks do not fully analyse judgement.

Suggested Content

Using the example of the Seven Sisters coastline:

- The processes of erosion and deposition have a considerable impact o For example, the Seven Sisters cliffs are retreating at a rate of 50–60 c erosional processes.
- The landforms along coastlines are also created through erosional pro wave-cut platform on the Seven Sisters coastline has been formed thr deposition.
- However, other factors also influence the shape of the coastline. For ex area can affect the effectiveness of erosion and deposition. The Seven which erodes fairly easily as it is quite a soft rock. It is also a porous ro can then cause it to erode more easily.
- Climate also influences the effectiveness of erosion and deposition. For ex of storms in 2013/14 meant the Seven Sisters saw seven years' worth of