

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS  
GENERAL CERTIFICATE OF SECONDARY EDUCATION**

**B561/01/02/RB**

**GEOGRAPHY B**

**Sustainable Decision Making (SDM)  
(Foundation and Higher Tier)**

**RESOURCE BOOKLET**

**MONDAY 13 JUNE 2011: Morning  
DURATION: 1 hour**

**THIS RESOURCE BOOKLET SHOULD BE AVAILABLE TO  
CANDIDATES FOR UP TO THREE WORKING WEEKS PRIOR  
TO THIS DATE.**

**SUITABLE FOR VISUALLY IMPAIRED CANDIDATES**

**READ INFORMATION OVERLEAF**

## **INSTRUCTIONS TO CANDIDATES**

**This Resource Booklet must be handed in to your teacher at the end of each lesson. YOU MUST NOT WRITE ON THE BOOKLET.**

## **INFORMATION FOR CANDIDATES**

- The following abbreviations may be used:  
  
MEDC – More Economically Developed Country.  
  
LEDC – Less Economically Developed Country.  
  
EU – European Union which includes the United Kingdom.

## **INSTRUCTION TO EXAMS OFFICER/INVIGILATOR**

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### **THE ISSUE:**








**THE TIDE IS HIGH – WHY IS THERE A NEED TO PROTECT SOME OF OUR COASTLINE?**

## **CONTENTS OF THE RESOURCE BOOKLET**

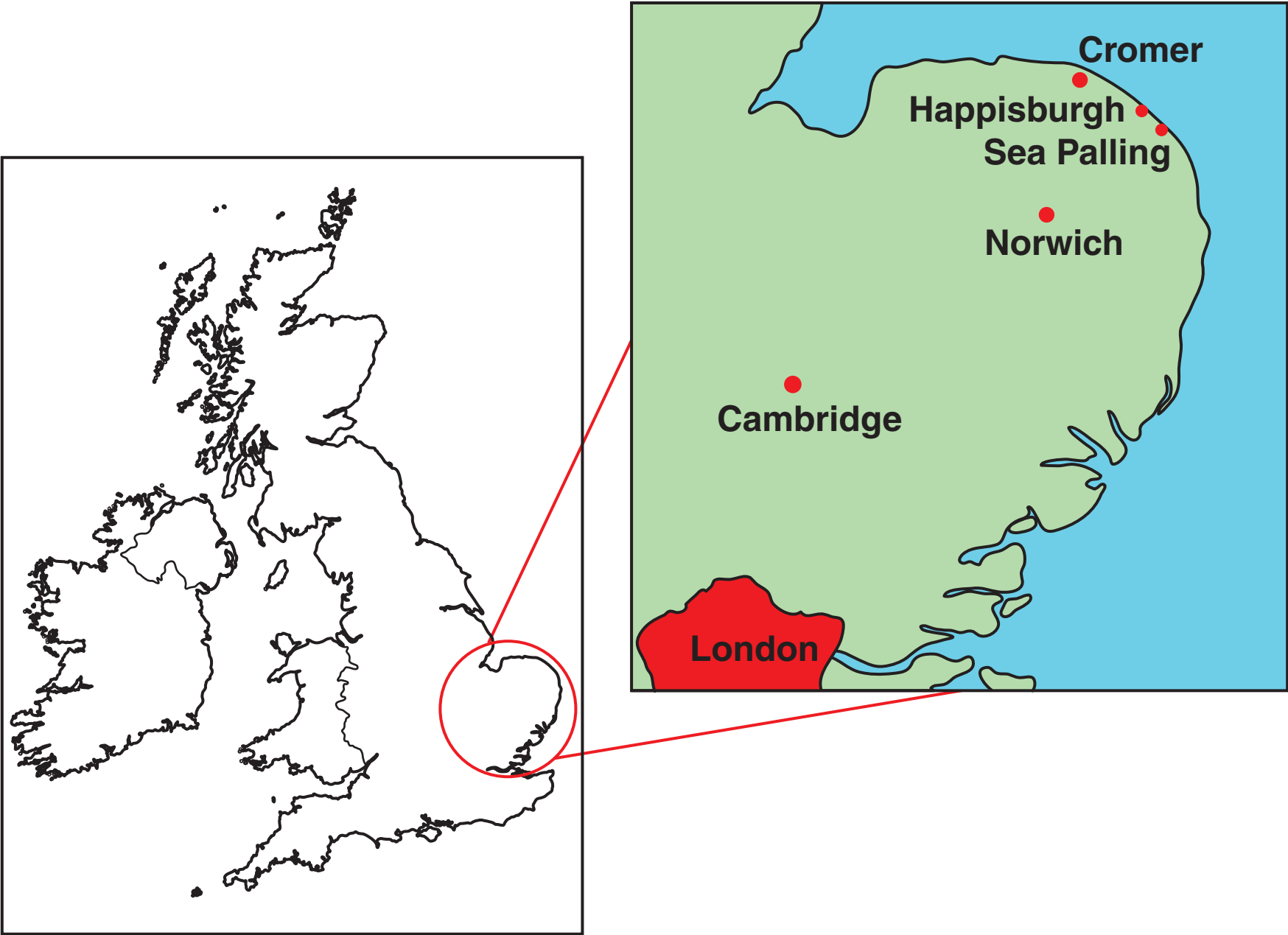
- Resource 1 – Hard engineering coastal protection methods
- Resource 2 – Coastal erosion at Happisburgh, Norfolk
- Resource 3 – Map of area around Happisburgh
- Resource 4 – Some opinions of stakeholders on coastal protection at Happisburgh
- Resource 5 – Soft engineering coastal protection methods
- Resource 6 – Managed retreat
- Resource 7 – Coastal management plans for the North Norfolk coastline in the short, medium and long term
- Resource 8 – Coastal erosion at Happisburgh

## RESOURCE 1




### HARD ENGINEERING COASTAL PROTECTION METHODS

PHOTOGRAPH	FACTS	LIFESPAN (APPROX. YEARS)	COST
	<b>SEA WALLS</b> There are many different types of sea walls: sloping, curved, stepped and vertical. They are made of concrete or stone. They stop the sea reaching the cliff base and reflect wave energy.	100	£3500 – £5000 per metre
	<b>GROYNES (WOODEN)</b> These reduce longshore drift by trapping sediment on one side. This builds up the beach, which acts as a natural barrier to erosion by absorbing the wave energy.	30–40	£1000 per metre
	<b>GROYNES (ROCK)</b> These reduce longshore drift by trapping sediment on one side. They are made of granite or other hard igneous or metamorphic rocks and so last up to three times longer than wood.	100	£1000 per cubic metre (m <sup>3</sup> )
	<b>RIP-RAP</b> is made from huge boulders of granite or other hard igneous or metamorphic rocks. They are placed at the base of cliffs to absorb the energy of the waves but let the water drain through them.	120	£1000 per cubic metre (m <sup>3</sup> )
	<b>GABIONS</b> These are cages of stones. They can be used to stabilise cliff bases and to absorb the energy of the waves. They are a short term measure as they are easily damaged by storm waves and the cages rust.	5–10	£50 per cubic metre (m <sup>3</sup> )
	<b>REVETMENTS</b> These are sloping features which absorb the energy of the waves but which let water and sediment through. Older revetments were made of wood. Some modern ones have shaped concrete or stone blocks laid on finer material and are known as <b>ROCK ARMOUR</b> .	Wooden 10  Rock armour 30	£800 per metre  £1200 per metre
	<b>TETRAPODS</b> These are usually made of concrete. Their unique shape makes them stable and they absorb the wave energy but allow the water to drain through them.	100	£1000 per cubic metre (m <sup>3</sup> )

COASTAL EROSION AT HAPPISBURGH, NORFOLK



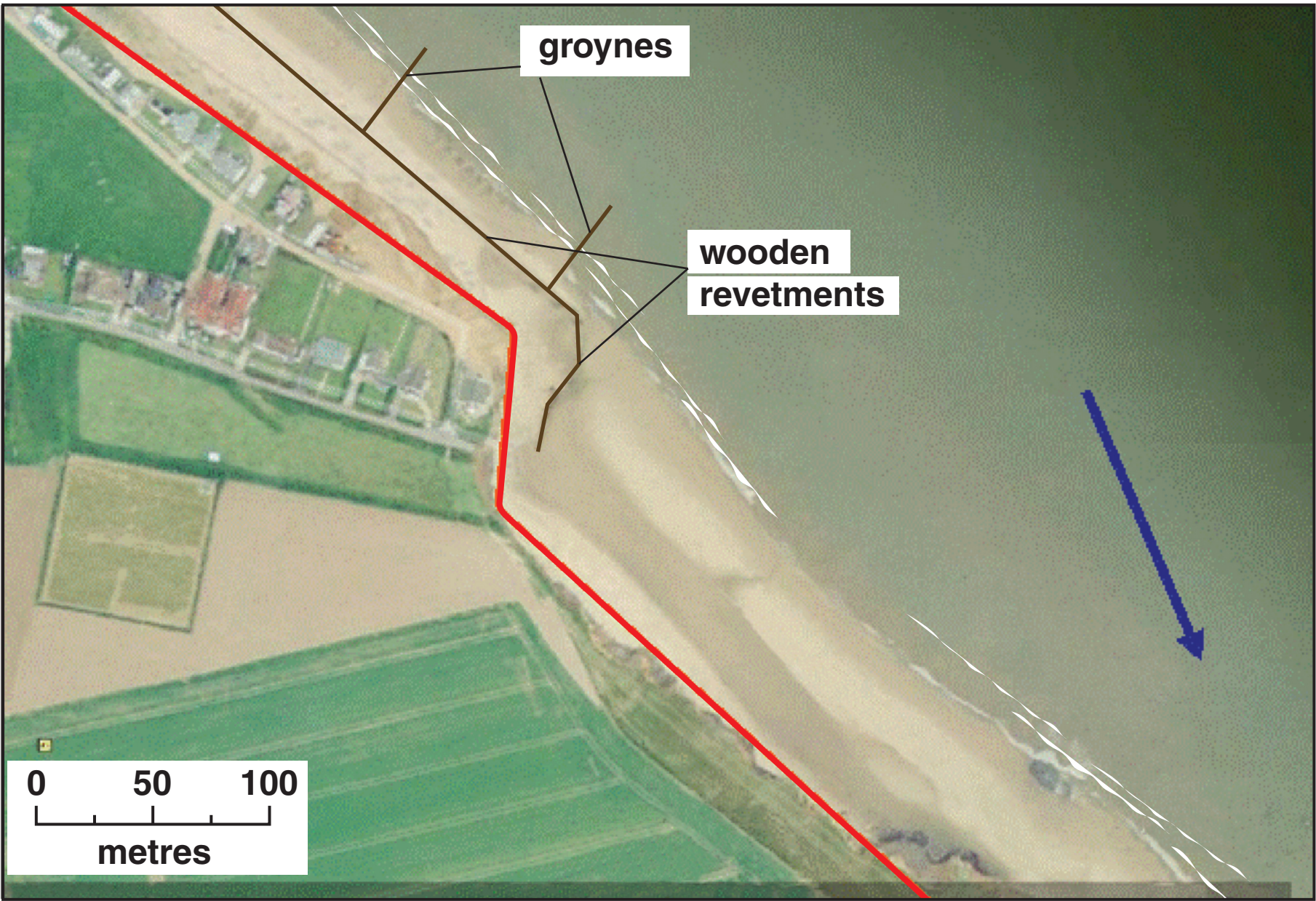
KEY TO SELECTED FEATURES ON 1999 AND 2006 AERIAL PHOTOGRAPHS OF HAPPISBURGH

	1999 cliff line
	prevailing wind direction
	missing sections of wooden revetment
X   Y	sites for measurement of erosion



RESOURCE 2 (continued)

1999



2006












## RESOURCE 3

### MAP OF AREA AROUND HAPPISBURGH



0 5  
km

#### Key:

- |   |              |   |                        |
|---|--------------|---|------------------------|
|  | A road       |  | part of Norfolk Broads |
|  | B road       |  | built-up area          |
|  | minor roads  |   |                        |
| PH  | public house |   |                        |
|  | holiday park |   |                        |
|  | picnic site  |   |                        |

## RESOURCE 4

### SOME OPINIONS OF STAKEHOLDERS ON COASTAL PROTECTION AT HAPPISBURGH

#### LOCAL COUNCILLOR

Happisburgh has a thriving community – a school, a shop, a Post Office, a pub and places where people work. It is a sustainable community so it should be protected.

#### BEACH ROAD RESIDENT

When I bought our house on Beach Road in Happisburgh, the government policy was to ‘hold the line’. Now the policy has changed and my property is worthless. I can’t afford to move, and no council accommodation is available. I’ve paid taxes all my life and I feel we should be protected here at Happisburgh.

#### LOCAL HISTORIAN

There are historic buildings in Happisburgh. They should be protected so that generations in the future can see them.

#### LOCAL FARMER

It’s not fair to spend £60 million on defending other places just along the coast such as Sea Palling whilst the land around Happisburgh is left to erode.

#### SEA PALLING RESIDENT

It’s not worth paying for the cost of the sea defences in Happisburgh. It’s a different story at Sea Palling which is a vibrant economic community with more shops, businesses and so on.

#### ENVIRONMENT MANAGER IN THE NORFOLK BROADS

The Norfolk Broads are a unique fresh water environment. They are protected from the sea by the local beaches which are made of sediment brought from further north along the coast. Sea defences at Happisburgh and Sea Palling will slow the movement of sediment. This may cause our beaches to become eroded and the Broads to flood with sea water. We must not let this happen!

#### LOCAL HOLIDAY PARK OWNER

Money should be spent by the government on sea defences to protect coastal industries, such as my holiday park. This will help to maintain jobs and livelihoods. Our coastline should be protected – we don’t want to lose it.

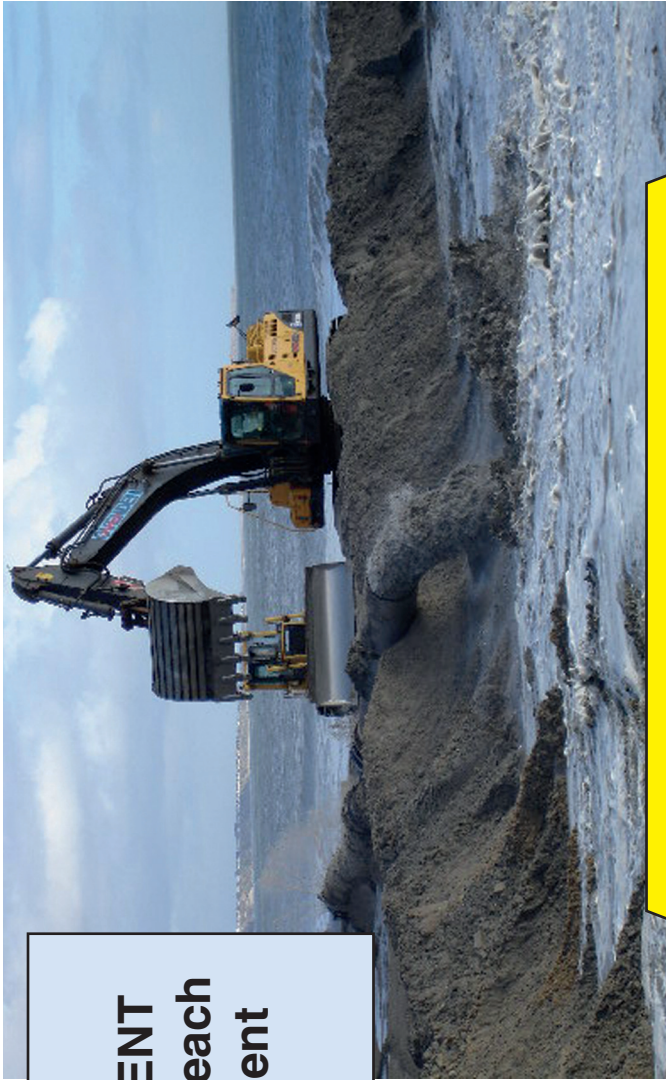
#### STALHAM RESIDENT

Spending money on sea defences is a waste of resources – the sea will always win. The money would be better spent on hospitals and schools especially with the country’s finances in the state they are in.



SOFT ENGINEERING COASTAL PROTECTION METHODS

**BEACH REPLENISHMENT**  
Add sediment to the beach  
Replace eroded sediment



**DUNE STABILISATION**  
Add sand to the dunes  
Manage footpaths  
Plant marram grass

**BEACHES, MUDFLATS,  
SALT MARSHES AND DUNES  
ARE THE MOST  
EFFICIENT WAY TO  
ABSORB WAVE ENERGY**



**SALT MARSHES**  
Remove sea defences to  
allow salt marsh to develop  
Plant marsh beds on the  
shoreline



**MUD FLATS**  
Maintain large areas of flat  
land around estuaries  
Restrict drainage on the mud flats  
Restrict building on the mud  
flats



## RESOURCE 6

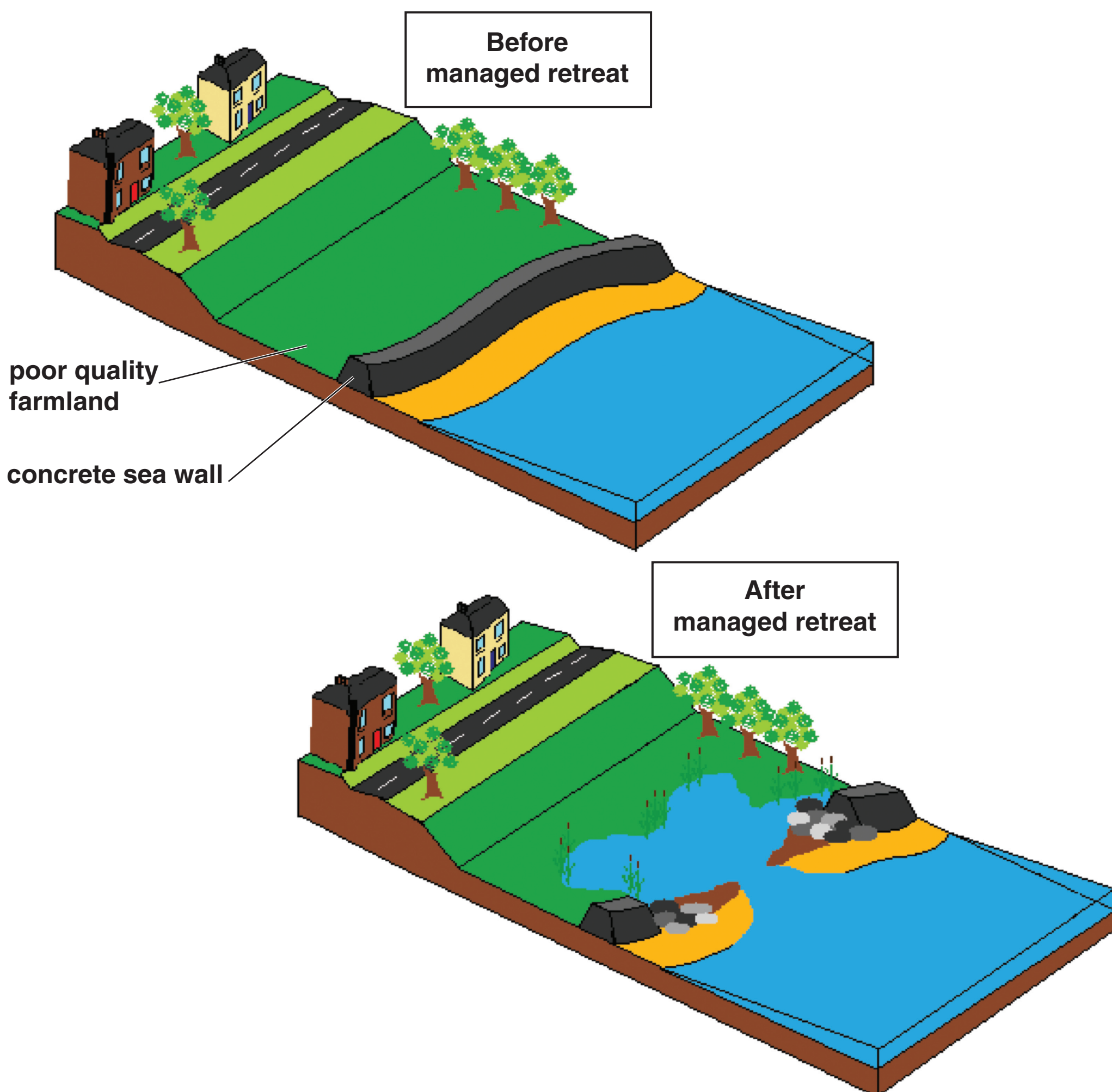
### MANAGED RETREAT

Before the use of coastal defences and the reclamation of land along the coast, the energy of high tides and coastal floods were absorbed by salt marshes, mud flats and beaches.

Managed retreat is a controversial policy. It allows the sea back into lowland areas, by removing existing coastal defences. The sea is then allowed to erode the land to reach a point of natural equilibrium, which protects inland areas from flooding.

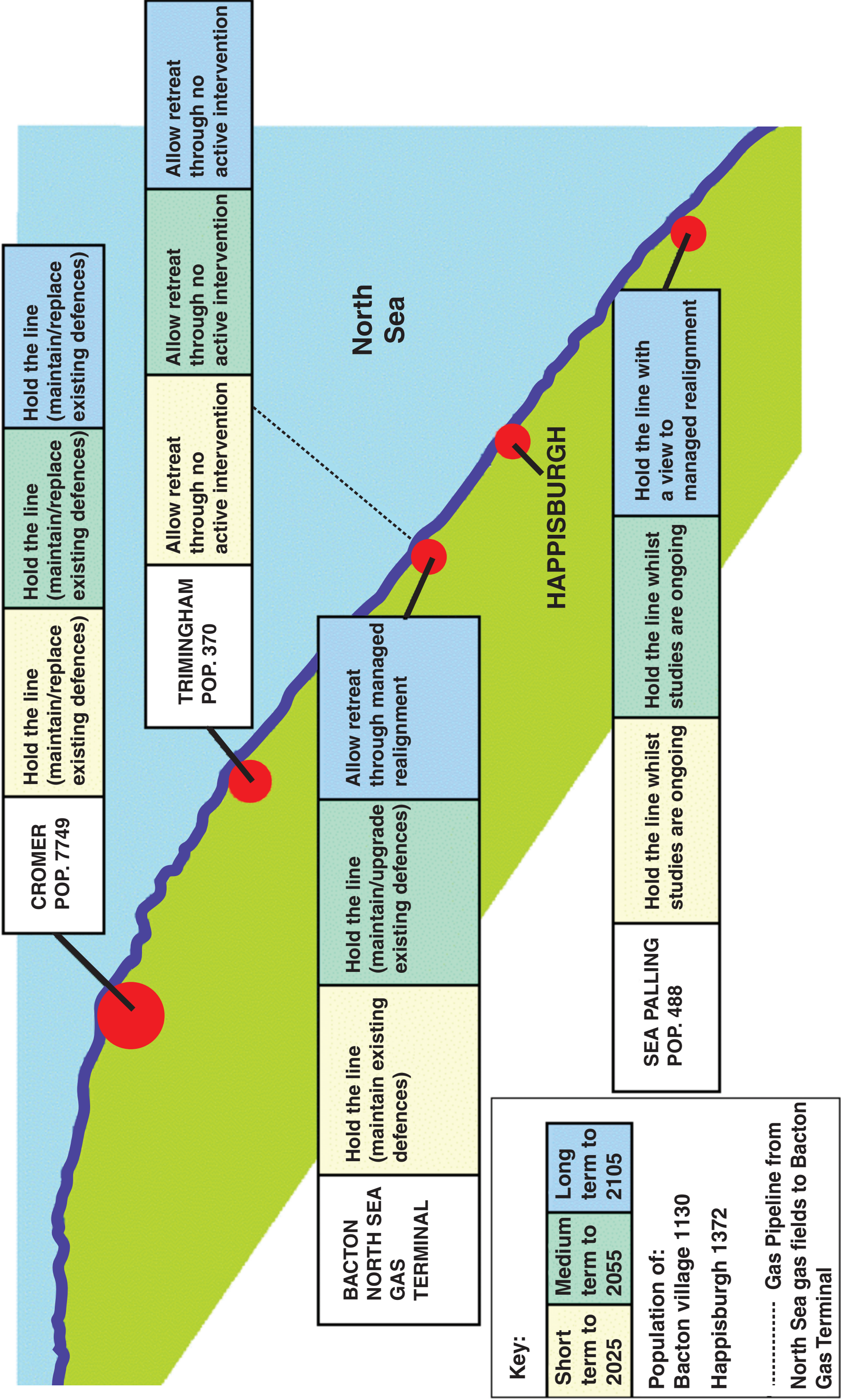
Managed retreat is used in areas considered to be of low value e.g. places not used for housing. This method is cheap; however compensation is paid to the land owners for the loss of their land.

In many areas where coastal defences are reaching the end of their life, managed retreat is being looked at as a viable option to replace the hard engineering of the past.





COASTAL MANAGEMENT PLANS FOR THE NORTH NORFOLK COASTLINE IN THE SHORT, MEDIUM AND LONG TERM





## **COASTAL EROSION AT HAPPISBURGH**

### **HAPPISBURGH'S PROBLEMS ARE NATIONAL PROBLEMS**

**The wooden sea defences built in the late 1950s at Happisburgh, North Norfolk have been failing over the last few years, and large chunks of the sandy cliffs are regularly collapsing into the sea. Changes in government policy now limit funding for coastal protection, but there is no compensation for any losses suffered.**

**Headline – front page of Coastal Concern Action Group Website**

### **COASTAL EROSION PLANS MOVE FORWARD**

**Homeowners in the coastal erosion hotspot Happisburgh will not have to wait long for discussions to start about the payments they may receive for their houses under a project to tackle the impacts of coastal change. North Norfolk District Council has been awarded a £3 million pot of government money to trial a number of ground breaking 'pathfinder projects' to tackle the impacts which erosion has on communities, individuals and businesses.**

**The most awaited of those projects is a plan for the council to offer to buy a small number of the most at-risk houses along Beach Road in Happisburgh and demolish them, allowing their occupants to buy another home instead of being left with nothing.**

**A property adviser will be appointed in January to start negotiations with homeowners on property values for the Buy and Demolish scheme. This scheme, though, would not be compulsory.**

**A spokesman for the council said it was hoped the Buy and Demolish scheme would produce a national formula of how to value a cliff-top house. Various factors would be taken into consideration, such as the value of the home when bought, what the buyer knew about levels of risk when they purchased and its value now if it were somewhere without the same risk.**

**Adapted from Eastern Daily Press, December 2009**



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