

A LEVEL

Independent Investigation Exemplar

GEOGRAPHY

H481

For first teaching in 2016

Independent Investigation Exemplar 1 – Coastal Landscapes (includes marking commentary)

Version 1



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INTRODUCING THE EXEMPLAR INVESTIGATION

We have produced this exemplar A Level Independent Investigation and marking commentary to support teachers in understanding the marking criteria and how it can be applied to students work. This is one of three investigations which can be used to show the marking criteria applied to different topic contexts (Coastal Landscapes, Glaciated Landscapes and Changing Spaces; Making Places).

We have used existing geography investigations completed by students several years ago. We felt it was important to use projects from students rather than exemplars written by developers with geography degrees. Therefore, there needs to be a slightly cautionary note, as we have applied the marking criteria to investigations that were not written for this criteria, however there are considerable similarities. We have therefore not given the investigations a total mark and overall grade, as this would set the standard prior to the current students submitting their own independent investigations in May 2018. In the summer of 2018 the Principal Moderator and their team will moderate samples from centres across the country with the key aim of ensuring that centres are applying the marking criteria consistently.

The investigations we have picked and applied the marking criteria to represent a range of styles and by no means suggest a particular way of approaching an investigation (from the title and key questions through to the layout and techniques). The marking criteria is split into six sections (OCR A level Geography specification pages 59-64) and we have provided commentary on each section, as well as given an indication of areas where the student could have made improvements to move up the level(s). For each section of the marking criteria we have given an indication of what has been done to meet a particular level and the evidence base for this. We have not annotated the exemplar investigations so that they can be used by both teachers and students alike. We do however suggest that when teachers mark their own students Independent Investigations that they are annotated to clearly indicate where particular sections of the marking criteria have been applied.

We understand that this component (Investigative Geography) within the A Level Geography is new for a number of teachers and so we are providing both support resources and CPD, these include::

Support resources:

- Independent Investigation Student Support Guide
- Independent Investigation clinics – FAQ 11/2016
<http://www.ocr.org.uk/qualifications/by-subject/geography/geography-news/a-level-geography-independent-investigation-webinar/> and FAQ 01/2017
<http://www.ocr.org.uk/qualifications/by-subject/geography/geography-news/a-level-geography-independent-investigation-webinar-jan-2017/>
- Joint Exam Board – Frequently Asked Questions
- Independent Investigation proposal form exemplars with commentary

CPD events:

- Tackling the independent Investigation
<https://www.cpdhub.ocr.org.uk/DesktopDefault.aspx?e=fjefcbdbhgnidcpindncdphpabihkmpcehicklnfcaaagjncol>
- Marking the Independent Investigation (June 2017)
<https://www.cpdhub.ocr.org.uk/DesktopDefault.aspx?e=fjefcbdbhgnidcpindncdphpabihkmpcehicklnfcaaagkfjdj>
- Understanding Human Fieldwork (resources to download)
<https://www.cpdhub.ocr.org.uk/DesktopDefault.aspx?e=eeefkacmhphiblnfcgpfpeikncmoaehickbnbabadejjldoba>
- Understanding Physical Fieldwork (resources to download)
<https://www.cpdhub.ocr.org.uk/DesktopDefault.aspx?e=eeefkacmhphiblnfcgpfpeikncmoblajpgjmocabgaomipdli>

Please see the [CPD hub](https://www.cpdhub.ocr.org.uk) for more information:
<https://www.cpdhub.ocr.org.uk>

INDEPENDENT INVESTIGATION MARKING COMMENTARY: COASTAL LANDSCAPES

Section 1: Planning, purpose and introduction

For this section of the marking criteria the investigation has mostly elements of L1 and some aspects at L2. This is a holistic decision based on competencies and evidence from the work.

- There is a partial attempt to include a plan following the hypothesis through the brief introduction (page 4).
- There is limited evidence of research that supports the investigation through wider geographical links, comparisons, models or theory (pages 3-4). This is a significant problem with this piece of work since the focus remains unclear throughout.
- The location is unclear, with a single map included with no annotations or contextualisation to the student's specific title/investigation (page 3).
- The plan is based on an individual geographical topic or issue, within a research framework (implicit, page 4), but definitions are incomplete or absent.
- There is some justification for the investigation provided in the introduction (implicit, not explicit, on page 4) and attempts to contextualise the fieldwork and research are included in the background (on pages 3-4).

Note (1) There is limited explicit evidence of research that supports the investigation through wider geographical links, comparisons, models or theory. However, in the context of this legacy piece of work that may not have been a requirement.

To potentially access higher levels within the marking criteria; the student might have considered the following:

- The purpose of the enquiry could be much more focused with an explicit aim and emphasis. The use of sub-questions may have helped this particular candidate. Might have been better with "Why is coastal erosion a concern? What are the options? Will the costs be worth it?" etc.
- The candidate could have considered clearer evidence of individual literature research, for example local blogs or forums linked to their topic, as well as more academic writing on usage of the high street. This could come from publications such as *Geography Review* and *GeoFactsheets*, or perhaps an undergraduate text. There will likely be free to access materials on the internet as well that could provide a theoretical background.
- The introduction should not have included extraneous and descriptive material, but instead could have perhaps included more of a focus on the physical processes operating, context of the sustainable vs hard defences, coastal sediment cell, Shoreline Management Plan (SMP) etc. <http://www.coastalkent.net/data/fact/document/Coastal%20management.pdf>
- The location of the coastal stretch could have better been located, e.g. use of Geographical Information Systems (GIS), Ordnance Survey (OS) maps or Google Earth as well as provide 4-figure OS coordinates and / or lat/long points. The map (page 2) was also missing scales and north arrows which should be included as a matter of good practice. A smaller-scale map (e.g. 1:50,000), or images, of the coastline would have provided better geo-location aspects, connecting the reader more readily to the place under investigation. Also <http://maps.environment-agency.gov.uk/> would be a potential source of information.
- Geographical terminology seems to be absent. A small table of definitions would have demonstrated that the candidate is clear in terms of wider geographical links as well as the context for the investigation.
- A plan is required for the investigation. This again could be linked to the literature research for example, suggesting how one informed the other.

Section 2: Data, information collection methods and sampling framework

For this section of the marking criteria the investigation clearly sits in both L1 and L2. This is a holistic decision based on competencies and evidence from the work.

- There is some knowledge and understanding of a range of data collection methodologies, including implicitly both quantitative and qualitative approaches. Approaches are partially justified with some limitations outlined, mostly appropriate to the investigation (not only on pages 5-6 but also in the analysis and evaluation section e.g. page 11).
- There is limited evidence of personalised methodologies and approaches to observe and record primary data and phenomena in the field and to incorporate secondary data and/or evidence, collected individually (e.g. page 16, own questionnaire).
- The data design framework (sampling, frequency, range and location choice) is weak (pages 5-6 provide a commentary) but with no relevant justification at that point.

Note (1) ethical and socio-political considerations are absent from this legacy work, so have not been considered in the decision about an appropriate Level.

Note (2) digital, geo-located data are absent from this legacy work, so have not been considered in the decision about an appropriate Level.

To potentially access higher levels within the marking criteria; the student might have considered the following:

- Data design framework could be significantly improved, giving more consideration to an overall sampling framework, especially in relation to the questionnaire data which is central to this investigation. A stratified survey based on age might have been more appropriate if a population profile was available from local Neighbourhood Statistics <http://www.neighbourhood.statistics.gov.uk/dissemination/>. The candidate could have also suggested the differences between qualitative and quantitative data in clearer ways.
- Annotated photographs using equipment to collect data would have been useful to show deeper understanding of the fieldwork process; they could have also be geo-located, e.g. detail pictures from a phone often have "exif" data which contains a lat/long.
- The Field Studies Council (FSC) Fold-out key on projects <http://www.field-studies-council.org/publications.aspx> has a very useful set of ideas on fieldwork design that could have assisted the candidate.
- Also, the FSC website shows more details of sampling and coastal surveys, again useful for this candidate <https://www.geography-fieldwork.org/a-level/coasts/high-energy-coasts/>
- It is now easy to access and download local SMP, e.g. for Kent <http://www.se-coastalgroup.org.uk/category/shoreline-management-plans>. Candidates could then process this geo-spatial data for inclusion with the work, if it is relevant to the outcomes.
- The ethical considerations might be especially linked to the questionnaire survey. These include privacy, consent, data protection, confidentiality and making sure that any personal information is not publicly shared, including images. Socio-political dimensions could include not creating an atmosphere where there could be mistrust or antipathy because of cultural differences.
- This candidate would have benefitted from an individual planning sheet, linking together the fieldwork to the focus of the investigation.

Section 3: Data presentation techniques

For this section of the marking criteria the investigation clearly sits in both L1 and L2. This is a holistic decision based on competencies and evidence from the work, especially as in this project the presentation is integrated within the analysis as is shown over a large number of pages.

- As all data has been presented, there is no evidence that the most influential data collected has been selected to help directly answer the title/hypothesis.
- The data presentation methods chosen were mostly well selected, with some knowledge and understanding of the relevant techniques for representing results. However there was a limited variety in the range of presentation techniques.
- The majority of data presentation methods were simpler with a lack of more sophisticated approaches.

To potentially access higher levels within the marking criteria; the student might have considered the following:

- More could have been made of the photographic study (pages 26-34), instead geo-locating these images onto an OS map, GIS or digital base map and providing OS map references. In addition these images might have been better annotated.
- Nowadays, GIS and Google Earth would have provided a good opportunity to geo-locate graphical presentation, e.g. proportional bars along the coast. GIS could also have been used as a convenient method to present coastal profile data.
- The transect data (pages 13-15) could have been reduced in size and stacked vertically on top of each other so that the reader could compare the data.
- The questionnaire data is poorly presented, in that the reader cannot easily link the pie charts to the questions as they are not provided in the key. It would have been better if the candidate had summarised all the outcomes onto a single sheet of A4 to allow comparisons between questions and then linked this to outcomes based on where people lived.

Section 4: Data analysis and explanation

For this section of the marking criteria the investigation sits mostly in L1, with some elements of L2. This is a holistic decision based on competencies and evidence from the work.

- There is partial knowledge and understanding of the techniques appropriate for analysing and explaining data and information, but only for certain aspects of the fieldwork (e.g. the use of descriptive statistics on page 24).
- Statistical analysis and significance testing are absent for both the data and topic of investigation when there are considerable opportunities, such as stone size and geomorphic processes.
- The analysis and explanation show a poor link to the stated hypothesis on page 4.
- There is limited evidence of knowledge, theory and geographical concepts being used to help explain findings. Again, this is due to the fact that the work has a broad hypothesis or focus, with a lack of key questions to relate findings to.

To potentially access higher levels within the marking criteria; the student might have considered the following:

- The candidate should be able to be able to link together some of their data e.g. sediment characteristics, and the focus for the study which is coastal management. Some theory is needed to link together for example wave type and beach shape.
- Better use of quantitative statistical tools as wells as modes and medians for instance on the questionnaire data would have provided an improvement. Sediment data could have been tabulated and used more effectively (although this data doesn't help answer their question).
- Nowadays there would have been a good opportunity to consider ideas such as risk and resilience in the context of coastal fieldwork and these could have been included as part of the analytical conversation, perhaps drawing on parallel examples from research documents.
- The analytical writing could have been strengthened by literature research. This would have made it less descriptive throughout the analysis.
- There are limitations in terms of the temporal dimension, e.g. a snapshot survey which have not been considered as part of the data analysis.
- Wider geographical links could also have been much better established, again this is where the theory is absent. Technical documents from the Department for Environment, Food & Rural Affairs (DEFRA) and the Environmental Agency (EA) would have helped with the analysis, allowing more relevant data to be used and comparisons made with other locations.
- The candidate could have made more use of qualitative data analysis, e.g. annotation of images and possibly coding of some of the open questionnaire data which appeared in the last questions.

Note (1) literature research this was not a requirement when this legacy work was produced.

Note (2) for legacy work there would have been less emphasis on qualitative data analysis techniques.

Section 5: Conclusions and investigation evaluation

For this section of the marking criteria the investigation shows elements of both L1 and L2. This is a holistic decision based on competencies and evidence from the work.

- There is a limited attempt to reach conclusions which are linked to the hypothesis stated on page 4, communicated by limited means of extended writing. Again the problem of a poor focus, hinders the competency of this conclusion.
- Limited elements of primary evidence (implicit only, no link clear link to the data collected – page 37) linked to arguments and conclusions. Secondary evidence not included.
- There is limited evidence that conducting an investigation extended geographical understanding with limited reference to the wider geographical context of the investigation (further discussion on page 37).
- The evaluation of the investigation is very limited to the identification of a few basic errors and problems (for example evidence on pages 11 and 24).

Note (1) ethical and socio-political considerations are absent from this legacy work, so have not been considered in the decision about an appropriate Level.

To potentially access higher levels within the marking criteria; the student might have considered the following:

- The problem of a poor initial focus is that it hinders the competency of the conclusions. The student needed to be really clear as to what their title/hypothesis was and be consistent throughout (for example, the title on the front page and the hypothesis stated on page 4 are different).
- There seems to be a missed opportunity to consider the wider geographical context of this work. As already stated, a good piece of research, e.g. the Coastal Handbook https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/292931/geho0610bsue-e-e.pdf would have provided a possible basis for understanding coastal management.
- Some of the suggestions for additional studies, e.g. page 37, are relevant, but it would have been more useful to have linked these to other pieces of evidence from contemporary sources. As they stand, they lack both depth and detail.
- There is no consideration of the ethical and socio-political dimensions, but these could have included in particular considerations of keeping the respondents data private etc. This is an overall consideration and may be included in the methodology instead, or in addition to this section. There might also have been a brief discussion regarding site protection, minimal disturbance to the beach etc.
- The conclusions and investigation evaluations are missing a robust “success” framework which as it stands, is mostly linked to methodology (measurement and operator error) rather than comments regarding validity. The FSC Fold-out key on projects <http://www.field-studies-council.org/publications/pubs/geographical-investigations.aspx> has a very useful set of ideas on evaluation. It considers the meanings of accuracy, reliability, precision errors as well as validity.

Section 6: Overall quality and communication of written work

- For this section of the marking criteria the investigation sits mostly in L2. This is a holistic decision based on competencies and evidence from the work.
- There is a variable standard of communication that has some relevance to the geographic purpose of the investigation.
- Arguments are present showing elements of individuality. Once again these are mostly implicit rather than explicit, for example in the final paragraph on page 19 and further discussion on page 37.
- The work is poorly or partially structured and lacks a logical order, for example the theory out of place on page 17 and page 37.
- Presentation is adequate with text and figures mostly integrated.
- Geographical terminology is present, but there are some written language errors.

Note (1) sources / references are absent from this legacy work, so have not been considered in the decision about an appropriate Level.

To potentially access higher levels within the marking criteria; the student might have considered the following:

- This reproduced typed version of this work comes in at just over 4300 words, but perhaps the candidate should have given more thought to the weighting of individual sections. The use of bullets, mini-summaries, annotations and tables, in some instances could have encouraged more technical summaries and succinctness. Candidates should be encouraged to consider other technical documents which are published to get ideas from.
- The candidate should have considered the discussion and analysis much more fully. Here a self-evaluation review framework would have been helpful, or been provided with examples of other documents where analysis has been successfully delivered.
- Harvard referencing should be encouraged at this level. One example of a guide is here http://education.exeter.ac.uk/dll/studyskills/harvard_referencing.htm. Alternatively tools within products such as MS word can create bibliographies automatically <https://support.office.com/en-gb/article/Create-a-bibliography-17686589-4824-4940-9c69-342c289fa2a5>
- Key questions, sub-hypotheses, etc. would enable the candidate to structure their work more clearly and appropriately for a 3000-4000 word piece.

'A' LEVEL GEOGRAPHY PROJECT

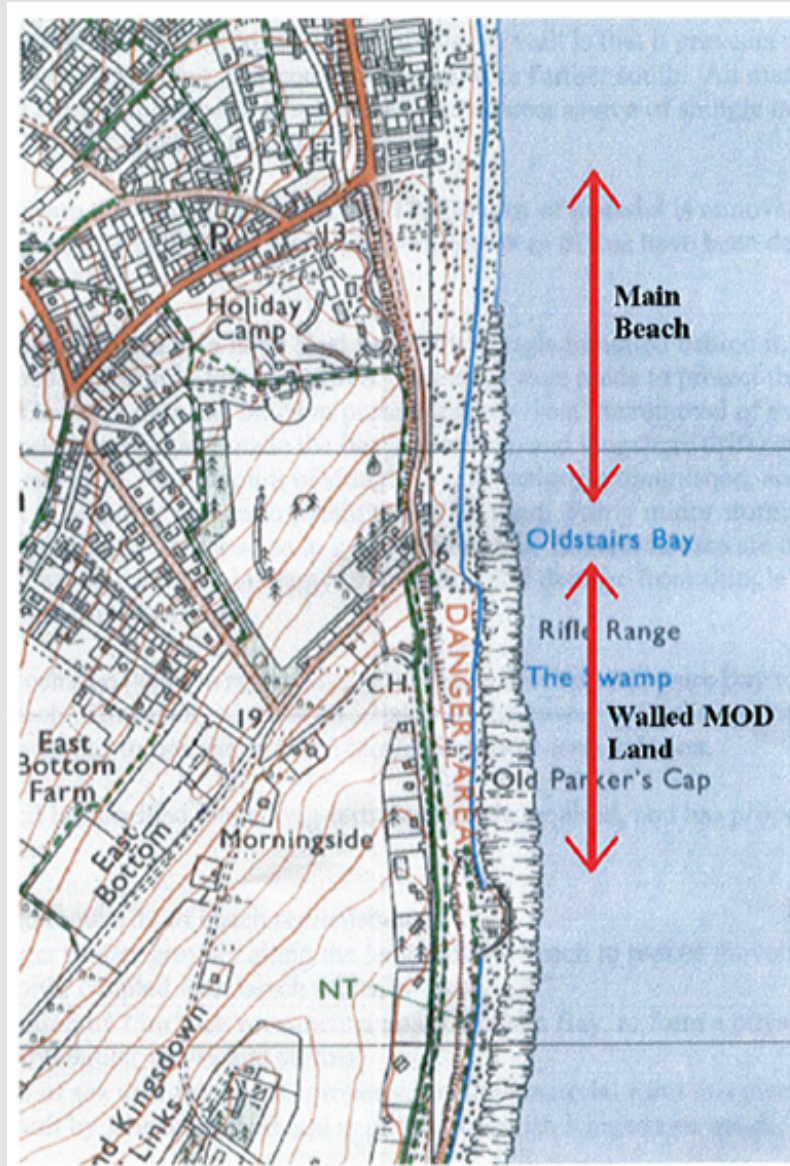


Coastal Defence Management at Oldstairs Bay

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Background: Kingsdown is a small settlement in a rural setting, with about 2500 inhabitants on the south-eastern tip of Kent. The main industries in the village are a mixture of high and low intensity arable and pastoral farming. However, on the coast of the village and in the centre, there is a fairly prominent tourist industry, consisting of Hotels, bed and Breakfasts and several pubs. The beach too acts as a key feature in the tourist industry of Kingsdown, where there are multiple beach huts and the beach is used for sunbathing and various sailing activities.



The beach consists of predominantly shingle, with small areas of sand. It stretches about 1.5km north from MoD land at Oldstairs Bay, and is an average of about 15m wide at spring high tide. The north end of the beach has a sea wall and promenade, to protect the housing and industry from flooding. South of this is an open stretch of beach about 1km long, which is unprotected, apart from six groynes, which have been overwhelmed by the quantities of shingle moving along the coast. As it is on the south coast, longshore drift is operating from the south of the beach to the north, due to the prevailing south-westerly wind. It is this action that carries huge quantities of material along the beach.

As shown on the map, to the south of the beach is a large area of MoD property, previously a rifle range. There is a sea wall, about 1km long, which protects this area of land from being eroded to the foot of the cliff. A consequence of this sea wall is that it prevents material removed from Oldstairs Bay being replaced by material from further south. All material from in front of the MoD sea wall has been removed, and the nearest source of shingle is an 80m long stretch of shingle to the south of the MoD property.

Secondary data from the council indicates that 18,000 tons of material is removed and carried north from Kingsdown beach each year. The consequences of this have been devastating to Oldstairs Bay.

Oldstairs bay was protected by a large steel wall with shingle mounted behind it, until this was destroyed by a severe storm in February 1998. Attempts were made to protect the bay with a rubble mount. However, this has failed to protect the bay from the removal of massive amounts of shingle. Regular storms have made the beach unstable, and longshore drift carries away much of the loosened material. The amount of shingle is now seriously diminished, and the beach has retreated so that at high tide the sea is within the 5m of the road. Fairly minor storms flood the road and throw enough shingle onto it so as to make it unusable. Several houses are on the landward side of the road, which would be in danger of flooding and damage from shingle when the beach recedes further and there is a storm.

Regular beach recharge (shingle replenishment) is carried out on Oldstairs Bay to abate the retreat of the beach. However, this new material is washed away before it can establish itself, and beach recharge has turned out to be an ineffective short-term solution.

The local council has decided that a long-term solution is required, and has proposed the following options:

- Increased regularity of beach replenishment.
- New larger timber groynes along the length of the beach to reduce movement of material to the north, coupled with beach replenishment.
- Construction of 75m rock revetments across Oldstairs Bay, to form a physical barrier to erosion by regular waves and storms.
- Removal of sea wall from MoD property, to allow material from this piece of land to move north by longshore drift and naturally replenish Kingsdown beach.

Hypothesis: A new coastal defence and management scheme is required at Oldstairs Bay.

Introduction: A study of the various options available to the council to improve the sea defences along the Kingsdown coast was undertaken, in order to determine the best option. An assessment of the effectiveness of each defence scheme, and a projection of the extent of erosion and damage that will happen if no action is taken was performed, based on the profile of the beach and previous erosion. A study of the options of the residents was also undertaken.

Methodology

A variety of techniques were employed to assess the rate at which the Oldstairs Bay end of Kingsdown beach is being removed, predict the consequences if no action is taken and assess the best coastal defence option, with respect of the views of residents and physical and economic factors.

Surveying

Surveys were carried out on three transects along the length of the beach.

Three metre rules and a spirit level were used to produce profiles of each transect. Starting from the water's edge, two metre rules were held vertically upright 1m apart, resting on the surface of the shingle. The third rule was held horizontally between the others, using a spirit level to ensure that it was level. One end of the third metre rule was held at the top of the rule closest to the sea whilst the other end was moved up and down the other rule, until the third rule was level. The distance down the rule that the end of the third rule fell was recorded as the increase in height up the beach. If the end of the third rule had to be moved down the rule closest to the sea to make it level, then the height increase was negative. This was done every metre up the beach on the transect, and the profile of the transect plotted on a line graph.

Transect one was in Oldstairs bay itself, as shown on the map. The levelling was carried out from the water's edge at low tide, up to the road. The survey was carried out in a straight line parallel to the rubble mound, and about 5m north of it.

Transect two was the long stretch of open beach, stretching from the second groyne north of the rifle range and reaching about 350m to the first groyne by the northern sea wall. Levelling was carried out from the water's edge at low tide to the road.

Transect three was a short transect (15m), between two groynes, about 100m north of transect two. Levelling was carried out from the water's edge at low tide, to the promenade.

Sampling

Stone sampling along the length of the beach, from the rifle range 600m was carried out, as well as up each of the three transects.

A 1m² quadrat was laid out using metre rules. A stone was taken from each of the four corners, and one closest to the centre. The B-axis of each of the five pebbles was measured to the nearest mm, and an average was found for each quadrat.

Transect sampling – The first quadrat was taken as close to the water's edge as was physically possible, and then every metre up the beach to the road on transects 1 and 2, and up to the promenade on transect 3.

Sampling along length of beach – One quadrat was measured every 50m along the storm ridge of the beach, from the rifle range 600m north. 50m was measured by pacing out the number of strides previously counted over a measured 50m on shingle.

The results from these four exercises were plotted on a scatter graph, where a line of best fit was drawn.

Photographic study

This exercise did not serve to provide impartial data about the physical properties of the beach, but instead serves to provide a comprehensive overview of the beach, the defences and in conjunction with maps and information from the council, the mechanisms operating on the beach (i.e. storms, longshore drift, storms etc.).

Some of the photography was carried out during 1998 and early 1999, as there was a major storm event on the beach during this winter, which did significant damage to defences, and removed a large amount of material from the beach. The storm itself, the aftermath and the defence programme that followed were photographed. The photographs from two years ago also serve to provide a comparison of the beach then and now, and illustrate the changes, which have occurred to the beach during this time. The second set of photographs was taken during September 2000, and focuses on the form of the beach and the mechanisms operating on the Kingsdown coastline.

Each photograph or set of photographs is accompanied with an account of what it is showing.

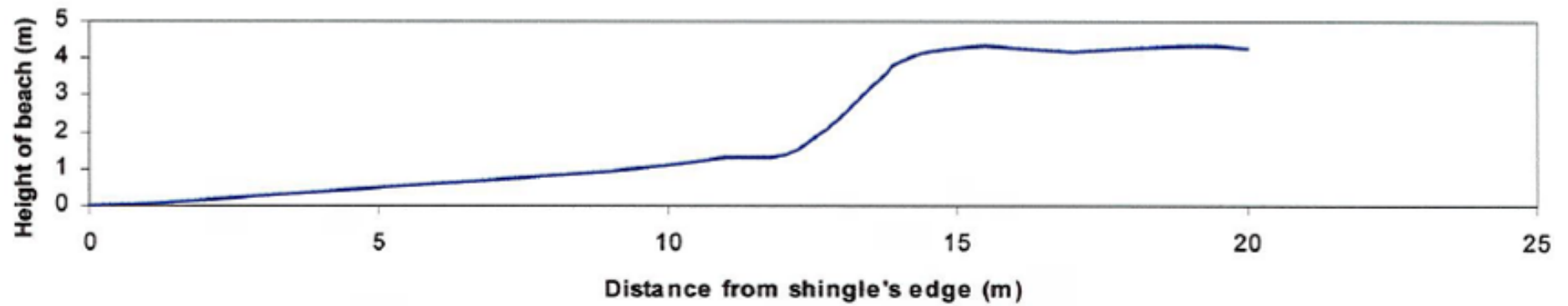
Questioning of residents

The questions shown in the data section were put to thirty people on a Saturday afternoon. A range of age groups was questioned, as well as an equal balance of sexes. About ten people on the beach itself were questioned, and the others were occupants of the properties in the immediate vicinity of the beach, who would be affected by any new defences on the beach. All those questioned were residents of Kingsdown. As well as the set questions, any other comments that residents made were recorded, for use in the analysis.

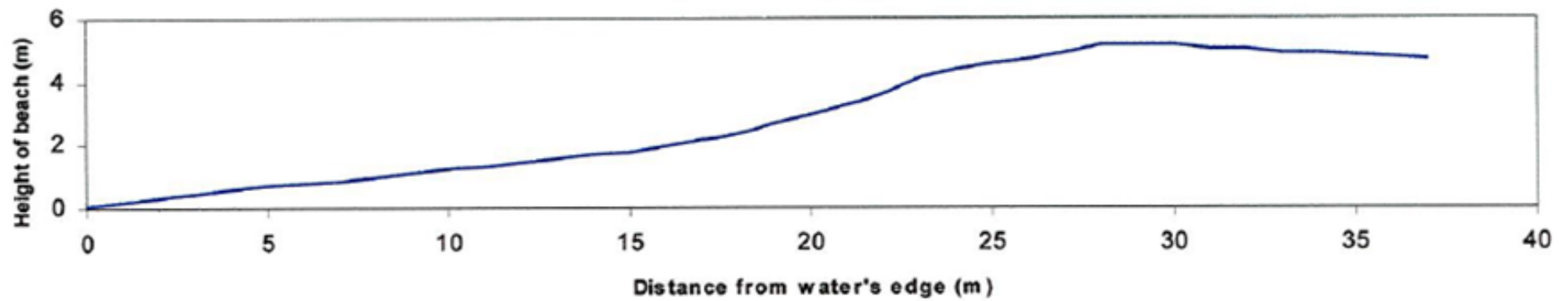
The results of this questioning were recorded on a rough notebook, and later presented on six doughnut charts.

Surveying

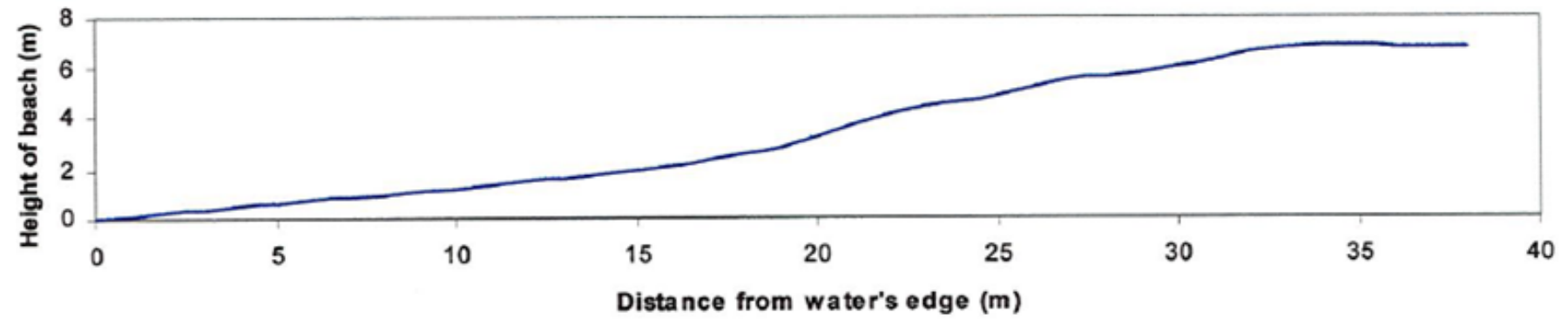
Transect 1. Leveling from shingle's edge to road at low tide.



Transect 2. Leveling from water's edge to the road at low tide.



Transect 3. Leveling from water's edge to road at high tide.



Analysis and Evaluation of Surveying

Transect 1

From the edge of the shingle this transect inclines at a very gentle angle in the swash zone, before there is a sudden large increase in height (about 2.5m) over a short distance, with a very steep incline. At the top of this ridge the beach flattens out and remains level up to the road.

It is important to note here that although the shingle finishes only 20m from the road, when the tide is fully out, there is a wave cut chalk platform, which extends another 20 to the sea. The swash zone of the beach is typical of any, although a lot shorter than usual. The steep ridge starting 12m from the shingle's edge is a result of rapid erosion and removal of beach material. Although not clear from this plot, the ridge is actually undercut at points and highly unstable. This profile represents an extremely narrow and unstable beach, which is rapidly being eroded further.

Transect 2

The gradient of this transect is slight at the water's edge, and increases up the beach. At about 18m from the water's edge there is an obvious increase in gradient, when the shingle ridge starts, there are then two obvious peaks at 23m and 27m from the water's edge where the tops of the shingle ridge and storm ridge are. The beach slopes down to the road from the storm ridge.

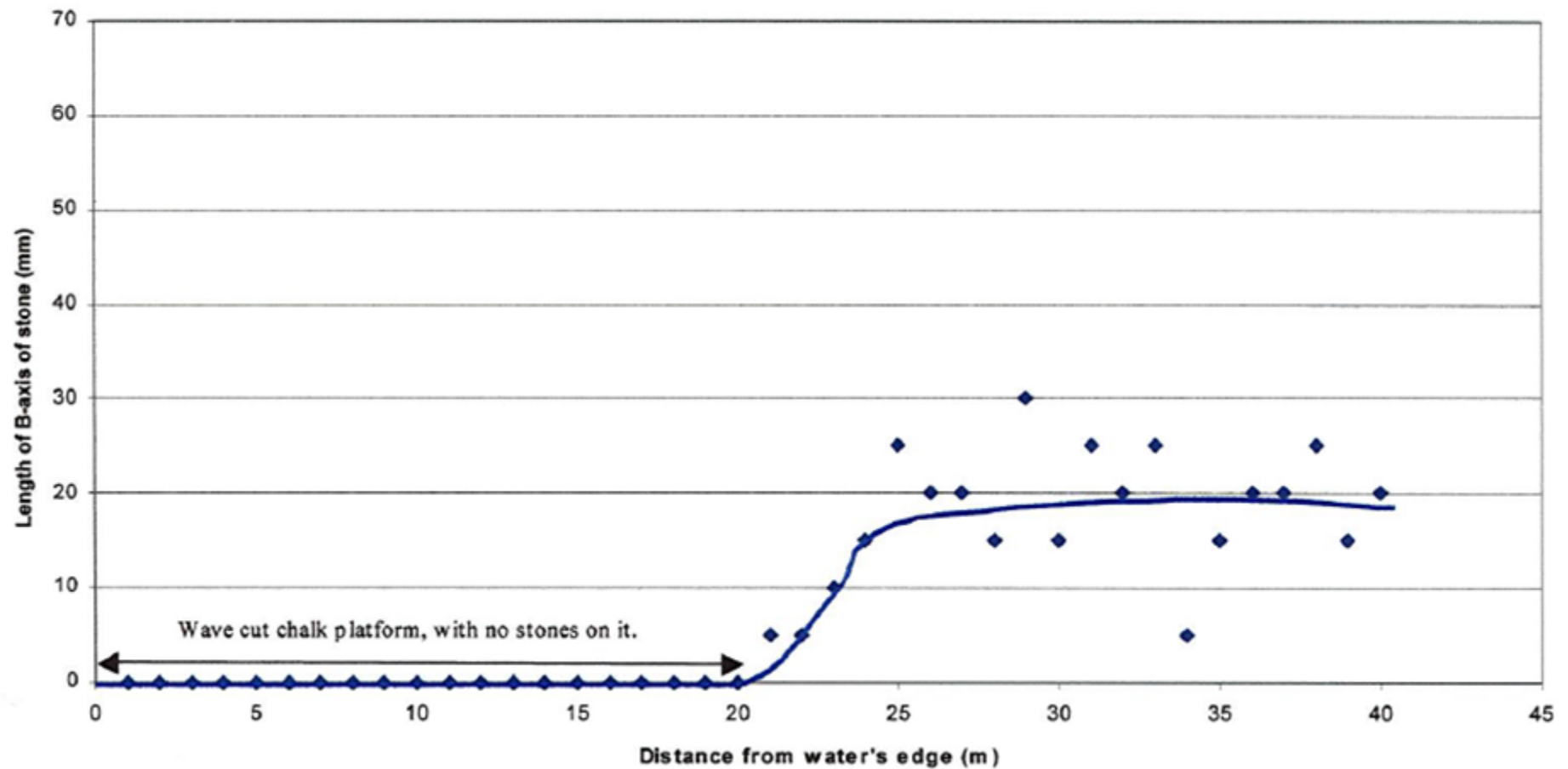
This transect is a textbook shape, although its features are less prominent than would be expected. This is a result of movement of shingle by earthmovers after a storm, which threw shingle onto the road. The shingle was put back onto the beach, and the beach has not had time to fully develop the characteristics expected.

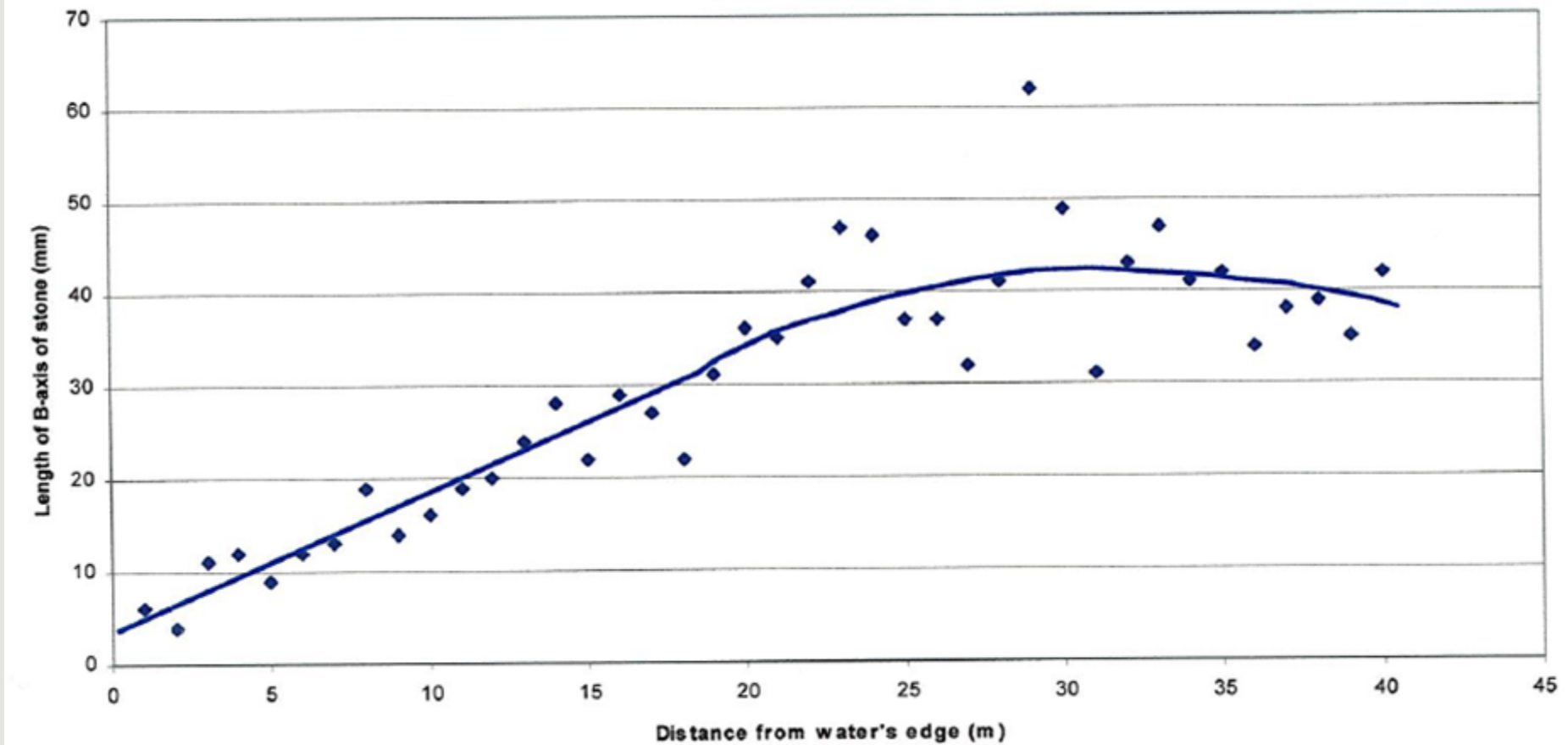
Transect 3

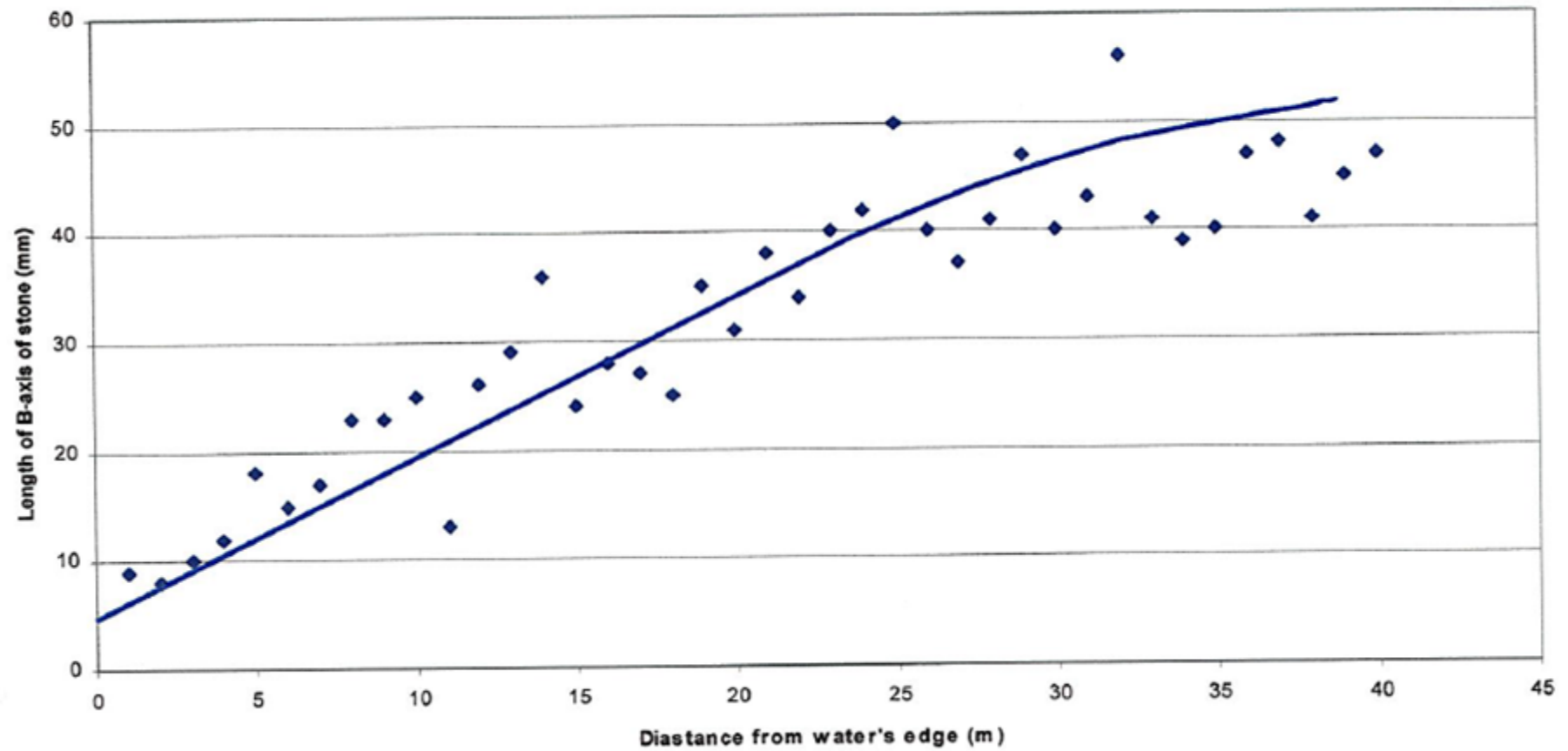
This transect is very similar to transect two. It displays the same subtle characteristics for the same reasons.

Levelling proved to be an accurate enough technique to provide a rough profile of each transect. However, measuring height increase every metre lead to some important details being omitted (as will show up in the photographic study) on transect 1. Measuring height increase every 0.5m would have been more appropriate. It is also important to note that some of the transects were very long, and their profile may have varied along their length. Performing surveys at 50m intervals along each transect would have provided a more complete picture.

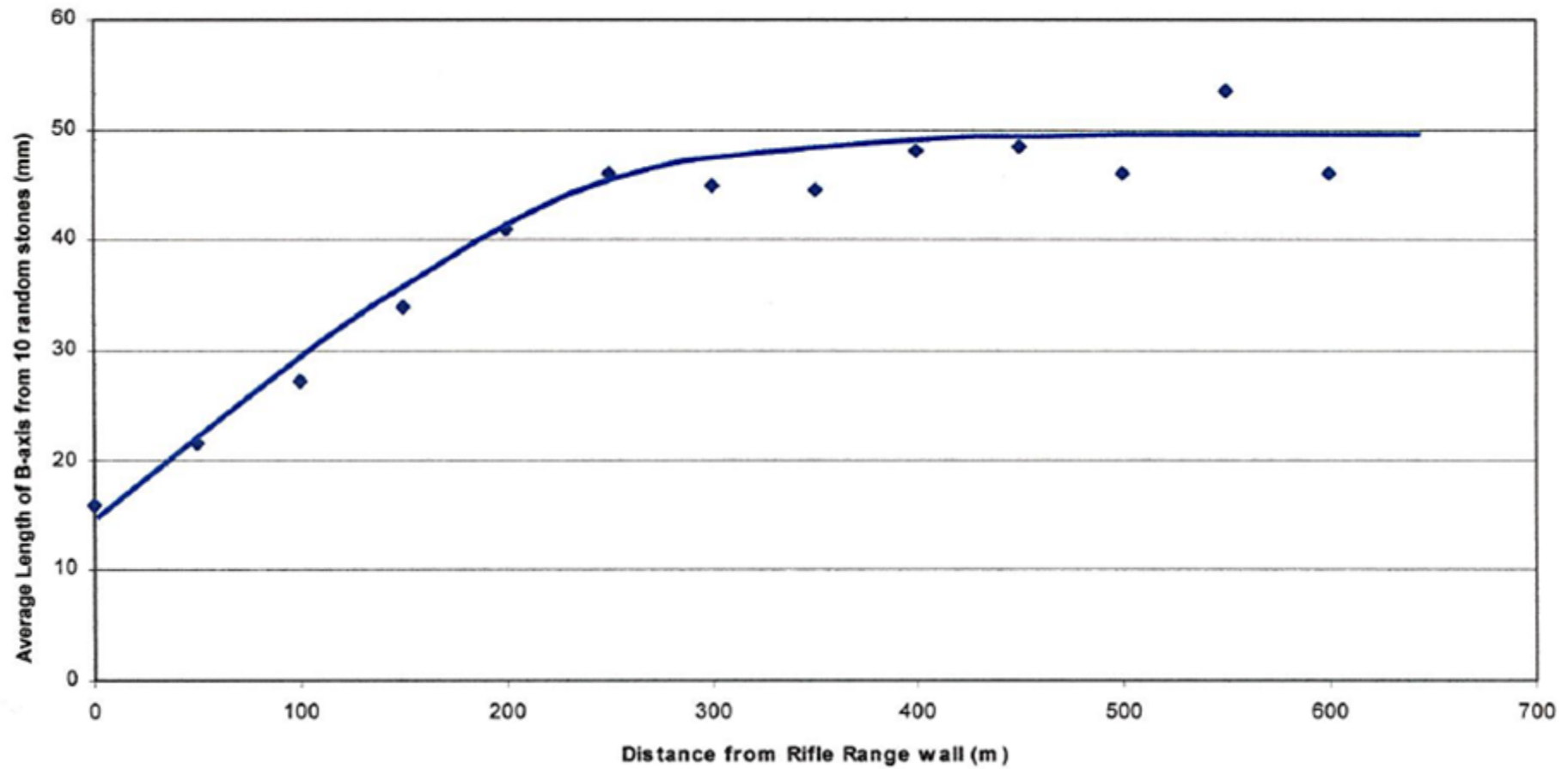
Sampling

Transect 1. Stone Particle size analysis from water's edge to road at low tide.

Transect 2. Stone Particle size analysis from water's edge to road at low tide.

Transect 3. Stone Particle size analysis from water's edge to road at low tide.

Graph to Show Average Particle Size in relation to the Distance from the Western Rifle Range wall



Analysis / Evaluation of Stone Sampling

Transect 1

The graph shows that there are no stones on this transect until 20m from the waterline, at which point there is a sudden increase in particle size up to about 18-20mm. The particle size then remains almost constant up to the road.

The chalk wave cut platform in front of Transect 1 does not have any shingle on it. The rest of the beach consists of shingle with an average B-axis of 20mm. This is due to the shingle replenishment scheme. Shingle brought by lorry to Oldstairs Bay was from one level of a beach, hence is all of similar size. These small particles are easily carried away from the bay by longshore drift. The lack of shingle beyond 20m from the road, shows that the entire beach is being removed, down to the chalk beneath it.

Transect 2

The graph shows a steady increase in particle size up the beach from a minimum of about 5mm at the water's edge, to 50mm 25m up the beach. After this point (the storm ridge) the shingle size decreases up to the road.

The pattern of shingle size on this transect is almost textbook, as would be expected on a natural beach. The shingle increases in size regularly due to attrition breaking and wearing larger stones into smaller stones at the water's edge. However, on this transect the shingle size decreases slightly after the storm ridge, as a result of shingle replenishment at the top of the beach.

Transect 3

The graph shows average shingle size to increase up the profile of this transect at a regular rate up to the storm ridge. After the storm ridge (25m from the water's edge) the shingle size remains almost constant.

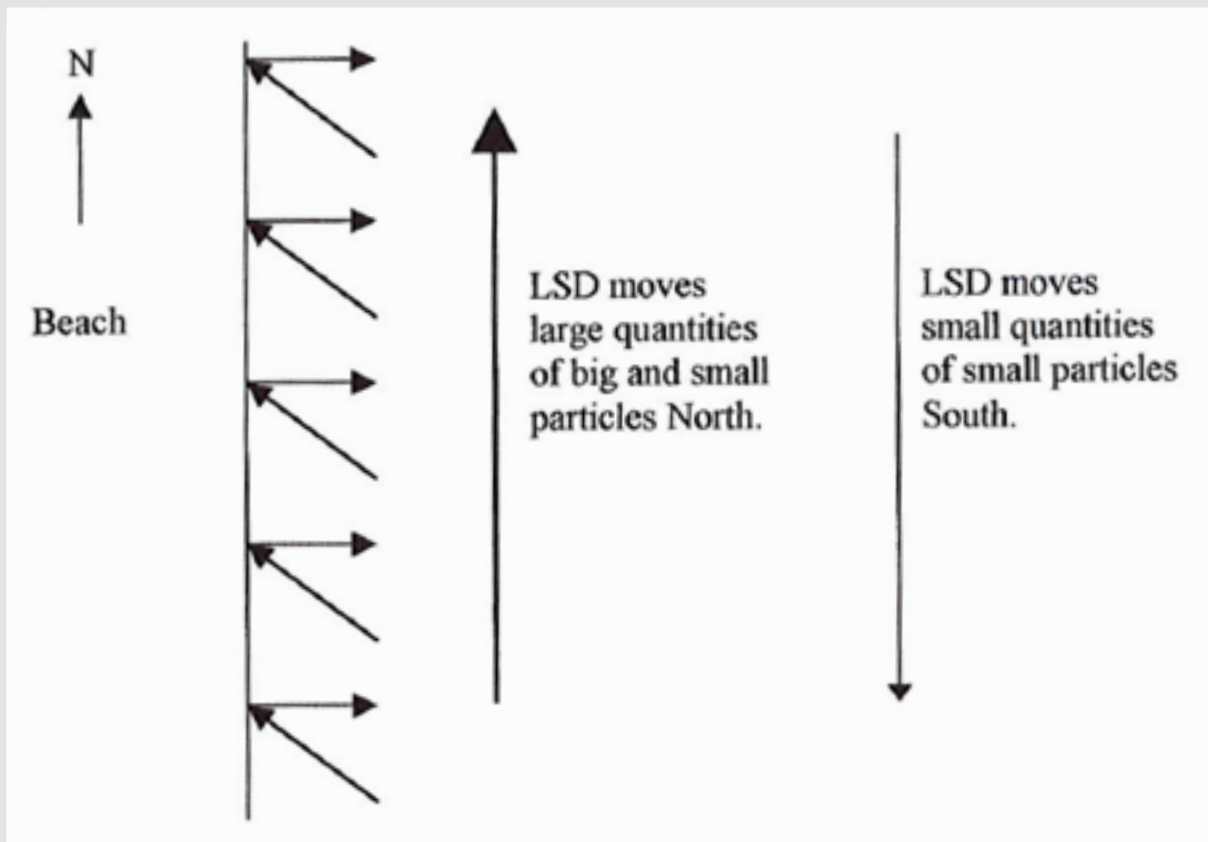
Again the pattern of shingle size on this transect is almost textbook. However, the pattern is again disturbed at the top of the beach where imported material has covered the original shingle.

Length of Beach (South to North)

Starting at the south of Oldstairs Bay, where shingle size is 15-20mm, particle size on the storm ridge increases for about 200m up the beach. This point is about 100m into transect 2. North of this point the particle size on the storm ridge remains almost constant.

Two factors account for this pattern: Shingle replenishment has occurred mostly at the southern end of the beach. The imported shingle was mainly of a small size (20mm), hence this reduces the average particle size towards the south of the beach. Further north than the point 200m from the MOD wall is not affected by shingle replenishment, so the shingle size is constant.

Longshore drift has also had an effect. The most powerful movement of materials along this coast is from the south to the north. Therefore the larger material is carried north, away from the southern end of the beach, and the less powerful waves only bring smaller particles back to the south. This results in a net reduction of particle size towards the south of the beach.



It is important to note that whilst longshore drift results in a net movement of material north, it is in fact a complex, dynamic and multidirectional process, and also that its effect is not constant throughout the year. Material moves from south to north for most of the year, but there are storm events and seasonal winds, which move material in the opposite direction reducing the net effect.

The large number of samples taken during sampling should have eliminated most sources of error by finding averages. However, as sampling was carried out on three transects on the same day, the tide would have come in significantly between the first and third transects. This may give a false impression of the relative shingle sizes up the beach. The sampling carried out along the length of the beach may also contain some errors, as it was not always easy to identify the storm ridge, so its position was judged by eye, and the shingle samples taken from there.

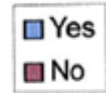
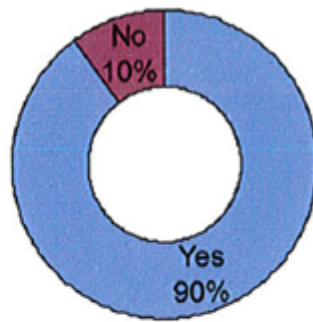
Questionnaire

Questioning of residents

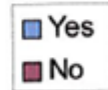
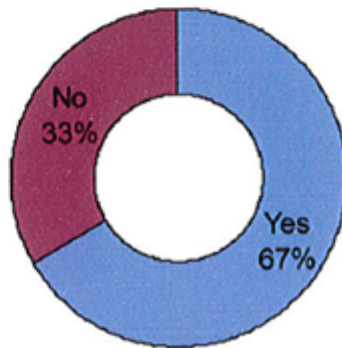
A brief summary of the coastal defence options under consideration by the council was given to each of these questioned, as well as a history of storms and coastal erosion on Kingsdown beach, before the following questions were asked:

1. Do you think that the homes adjacent to the stretch of beach near Oldstairs Bay will be in danger if no action is taken?
2. Would you be in favour of new costal defences, even if this compromised the view?
3. Do you think that the defence from the sea of Oldstairs bay should be made a priority for council spending? Possibly at the expense of other local projects.
4. Which of the following options for preventing flooding and storm damage at Oldstairs bay would you favour?
 - a) Continued regular beach recharge (shingle replenishment) to maintain frontline.
 - b) Introduction of new, larger timber groins, couple with option A.
 - c) Construction of new 75m rock revetment across Oldstairs bay, forming a physical barrier to storm waves and regular erosion.
5. Which of the following options for reducing the removal of material from Oldstairs bay would you favour?
 - a) Continue with existing defences, coupled with regular shingle replenishment.
 - b) Removal of southern MoD seawall to maintain shingle levels in Oldstairs bay. (An explanation of why this would help was given)
6. Would you be opposed to a drastic measure such as a seawall or an extensive rubble mount breakwater, on the grounds that it would destroy the beach?

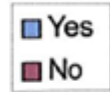
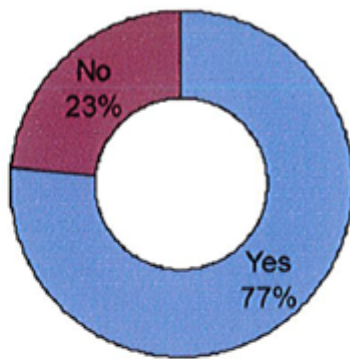
Question 1.



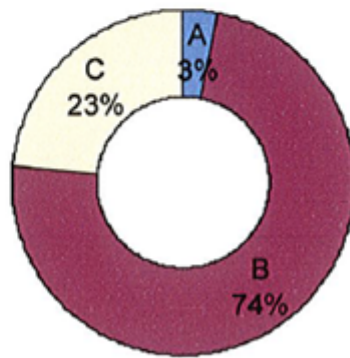
Question 2.



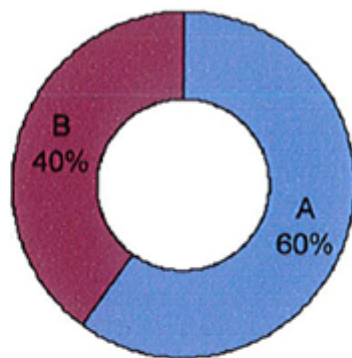
Question 3.



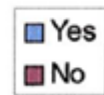
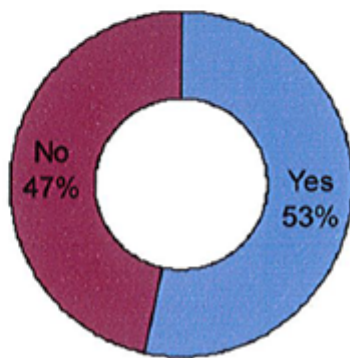
Question 4.



Question 5.



Question 6.



Analysis and Evaluation of Residents Questionnaire

The results of these questions show the following:

- Most people (90%) feel think that houses on the coast at Oldstairs Bay will be in danger if no action is taken.
- Most people (67%) would be in favour of new defences, even if this compromised the view.
- Most people (77%) think that new costal defences should be made a spending priority by the council.
- Most people (74%) favour the construction of new timber groynes coupled with shingle replenishment as the best scheme for preventing flooding and storm damage to housing in Oldstairs Bay, fewer (23%) favour a new 75m rock revetment across Oldstairs Bay, very few (3%) would favour only shingle replenishment.
- Most people (60%) would not favour the removal of the MoD sea wall to maintain the beach at Oldstairs Bay.
- Marginally, most people (53%) would be opposed to a drastic measure such as sea wall to protect Oldstairs Bay.

These findings show that residents of Kingsdown are aware of risk that homes on the sea front will be in if new defences are not built, and most are keen to see new defences built. However, residents favour the less drastic options, involving sustaining the frontline of the beach as opposed to building solid defences of removing the sea wall protecting the MoD property.

Details such as age and sex of those questioned were omitted from results, as these not considered to be a significant factor in this case.

It should be noted that the views of residents are affected by the visual effect and general disturbance a major works scheme will cause on their doorsteps. These results may not actually reflect the measures the residents think will actually provide the best protection for Oldstairs Bay.

Photographic Study

Photographic study



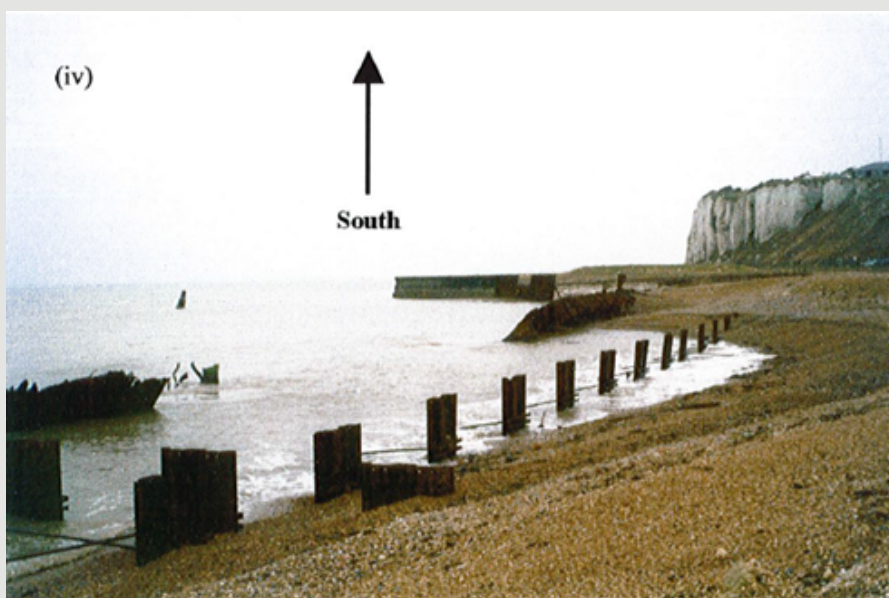
(i) The steel wall in 1997 before storm damage. This wall enclosed Oldstairs Bay and protected it from erosion. This photograph is taken from the seaward side of the wall. Behind the wall rubble is mounted.



(ii) The steel wall from the landward side, in February 1998 during the storm which destroyed it. The heavy shingle content of huge waves pounded the wall into pieces.



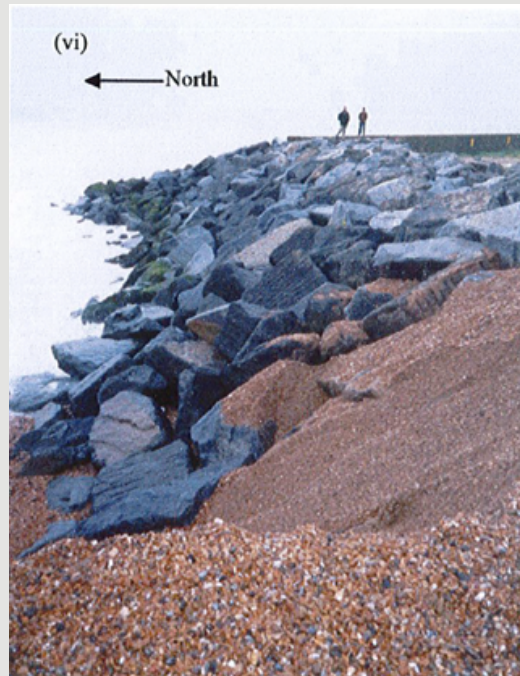
(iii) Also During the storm, this photograph (looking south along Oldstairs bay) shows how the wall has been buckled by the storm and eventually flattened. The waves are now free to advance up the beach. Note that on the unprotected beach north of the metal wall has allowed shingle to be thrown up onto the road. This storm closed the road for four days and caused thousands of pounds worth of damage. This was mainly due to the narrowness of the beach.



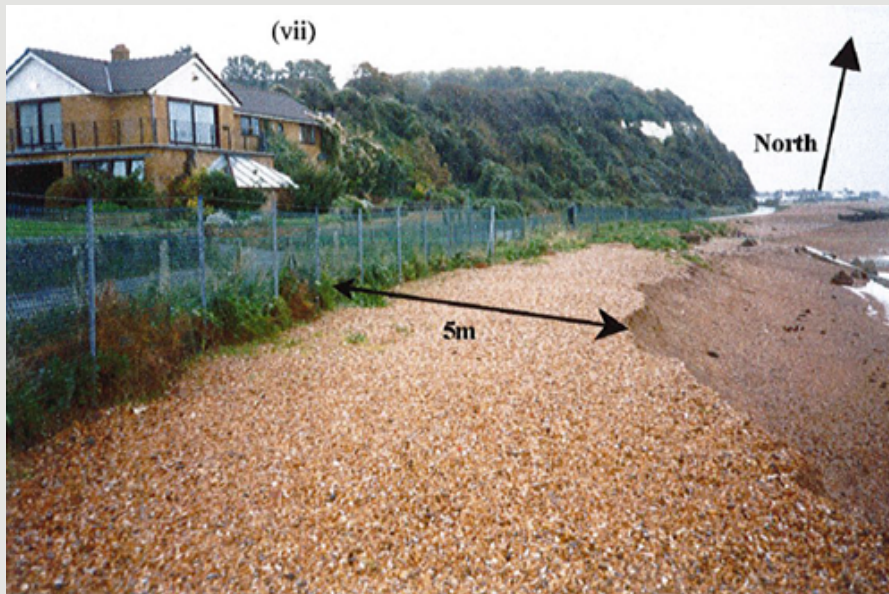
(iv) One month after the storm, the metal has been completely destroyed and removed by the sea. Note also that the sea has immediately encroached onto the previously dry land, forcing the bay to open up closer to the road. Within a month of unusallu bad weather the sea has already advanced more than 10m inland.



(v) This is Oldstairs Bay in September 2000. In the background is the housing and the road endangered by the advancing sea. In the foreground is the rock revetment built to replace the metal wall. During the 30 months since the storm the bay has retreated about 40m, despite the revetment.



(vi) This is rock revetment built in 1998 to protect the bay. It runs perpendicular to the beach at the south of the Oldstairs Bay.



(vii) The shingle at the top of the bay. The road is only 5m from the top of the shingle ridge. This distance could easily be covered by storm waves.



(viii) The bay has been exaggerated. This part of the beach is now extremely narrow. There is a very small mass of shingle left in the bay.



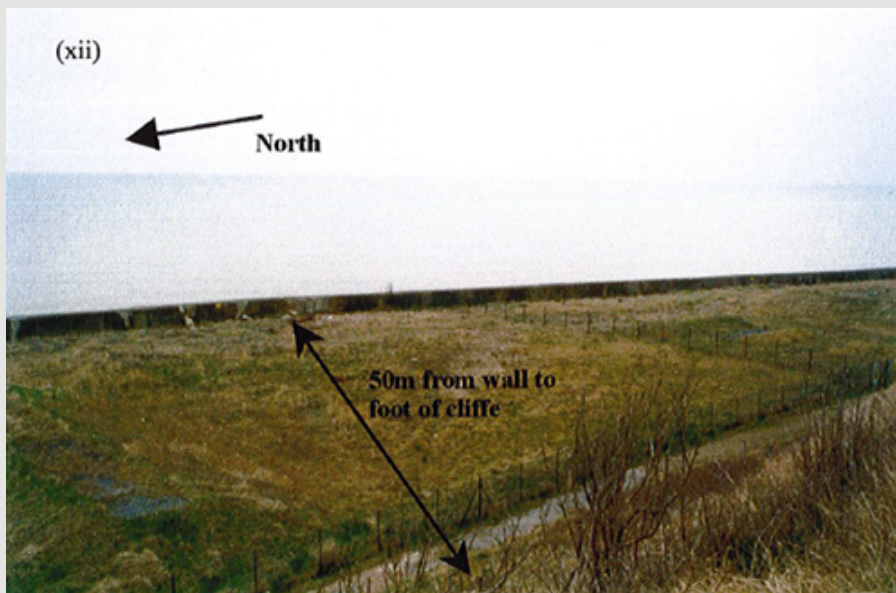
(ix) An extremely steep and unstably shingle ridge (approximately 2.5m high) has developed at the top of the beach. The steepness is caused by repeated undercutting.



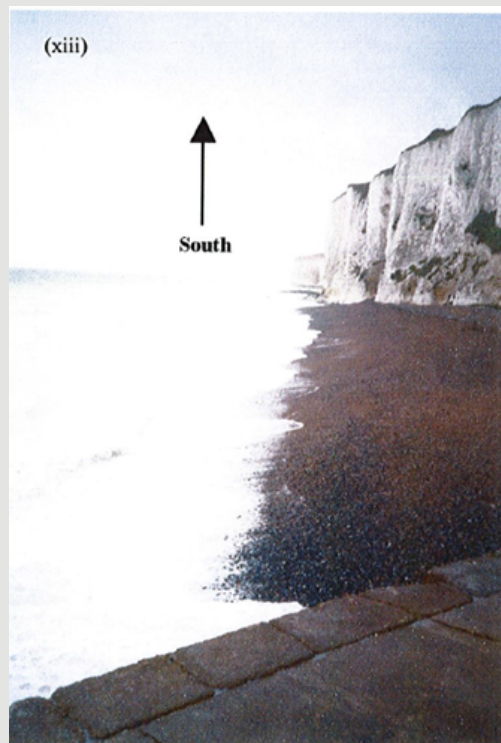
(x) Evidence of recent collapse of the shingle ridge is shown here. This ridge is so unstable that it collapses beneath gentle pressure from a foot.



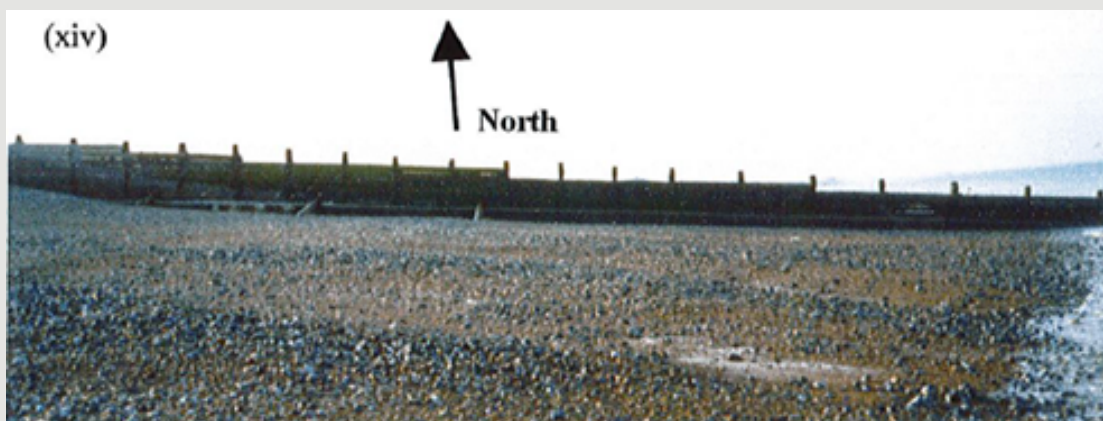
(xi) Taken looking down from the top of the shingle ridge, this photograph shows just how steep it is. Note also that the shingle at the top consists mainly of small particles and is highly unsorted. This is a result of the shingle replenishment programme, which has led to Oldstairs Bay consisting entirely of imported shingle, which is small and easily transported.



(xii) Looking down from the cliff top, this is the area of MOD property south of Oldstairs Bay. The wall has been there for over 40 years, and all beach material has been removed from in front of it. This piece of land jutting out from the cliff acts as a barrier to movement of shingle southwards to replenish Oldstairs Bay.



(xiii) At the southern tip end of the MOD sea wall, over 1km south of Oldstairs Bay, this beach is the nearest source of shingle to be carried north by LSD and Replenish Kingsdown Beach.



(xiv) In the middle section of Kingsdown Beach, about 500m north of Oldstairs Bay, this is a new wooden groyne (at low tide) in 1995.



(xv) This is the same groyne (at high tide) in August 2000. Southward movement of material due to longshore drift has overwhelmed and buried relatively new groynes.



(xvi) At the north end of the beach this sea wall in 1998, built to protect housing behind it.



(xvii) This is the same sea wall (from a different perspective) in August 2000. The height of the shingle against the wall has risen about 1m. The shingle has come from the Oldstairs Bay end of the beach.



(xviii) The boat ramp at the north end of the beach was built in 1995. Photographed here in September 2000, it has almost been completely buried by shingle from the south.

Analysis and Evaluation

The photographic study shows clearly that the state of the beach at Oldstairs Bay is inadequate to provide defence for the coastline, and that there is immediate danger posed to the road and the housing adjacent to the beach.

Photography provided a more dramatic view of the situation at the beach than other collected data could, and also showed some important details omitted by surveying and sampling. However, it should be noted that photography is not an impartial data collection method, and that clever use of the camera and the perspective from which a photograph is taken can exaggerate a situation or lead to a biased representation of a situation.

Conclusion

Conclusion

Single replenishment or new timber groynes are only temporary solutions to the problem of the shingle removal at Oldstairs Bay. Although favoured by residents, these options will only slow the removal of material from Oldstairs Bay and will fail to permanently stabilize the beach to form a barrier protecting the coastline.

A rock revetment or wall across Oldstairs Bay will protect the Bay, but will only move the problem of heavy erosion and lack of beach material further north up the beach, where a new bay will form, and the same problems will occur.

Although an extensive and expensive project, the complete or partial removal of the concrete wall protecting the MoD property, to allow material to be naturally moved North by LSD from this new beach, replacing lost material at Oldstairs Bay, is the only long term solution to erosion at Oldstairs Bay. There is nothing of economic value on this piece of land, and the piece of land is wide enough for the sea not to threaten the cliffs.

The original hypothesis was answered early on in this project. Hence a new question, considering which is the best coastal defence option at Oldstairs Bay, has emerged. The answer to which is the complete or partial removal of the sea wall to the south of Oldstairs Bay.

Further discussion

Coastal management schemes other than those discussed in this project are often implemented on other beaches. As it is a small insignificant village, a managed retreat of the coastline may have been considered as a cheaper long-term solution. However, defences at Oldstairs Bay have been neglected for so long that the situation has become critical, prompting an urgent response. The road and housing adjacent to the beach is now in immediate danger, making a managed retreat of the coast an unfeasible option, and the beach now requires much more expensive defences.

With recent climatic changes leading to an increase in sea level and more severe storms in the winter, potentially dangerous situations similar to that at Oldstairs Bay may begin to arise more frequently around the British coastline. It is therefore wise for local authorities in coastal regions to form long-term strategies for their coastal management.



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