A-Level Geography

7073/C: Independent Investigation (NEA)

Principal Moderators Report

Published: August 2024

Contents

The below table is interactive. You can press the control button click on the title of the question to go directly to that page.

Summary

Introduction

This report includes observations on the accuracy of assessment judgements on the NEA made by centres. It indicates areas of good practice and also identifies areas where requirements have been misinterpreted. The report aims to provide constructive advice to centres on the criteria for accessing higher levels in the four areas of the mark scheme. Moderation of centre-assessed work is carried out in order to quality assure the internal assessment judgements made by teachers within a centre. Centres should refer to their individual centre feedback report provided when results are issued. In combination, the centre-specific document and this overall report should help to support centres' internal assessment and moderation practice for future series.

Students generally produced work that was devised and completed in a local area, and was very much in the spirit and ethos of the Independent Investigation. After a few years of disruption, virtually all of the work seen had a basis in primary data collection and titles selected by students were focused at a suitably small scale. The most successful studies were founded on questions justified on the basis of clear underlying geographical ideas, concepts or theories, but firmly based in the real world and conducted at a manageable scale. A wide variety of interesting and appropriate investigations were undertaken by students this year, derived from many different parts of the specification content.

Areas where students excelled

- There was much evidence of thorough and purposeful research with sources ranging from text books/Student A level magazines to published academic work. This is a key part of the investigation which links to all parts of the written report.
- It was noticeable that students were more aware of appropriate methods to collect a range of data and information targeted at the individual sub hypotheses being investigated.
- Many students demonstrated the ability to present data in a variety of forms – from simple maps and bar graphs to complex maps with layered data or located proportional symbols. More students are using GIS packages effectively to present their data
- The majority are now organising their investigation by sub-hypothesis/research question and then structuring their methodology, presentation/analysis and conclusions around each hypothesis/research question.
- Many students wrote more concise interpretations of their data and focused on answering the research questions, rather than simply describing individual graphs. More students did some data manipulation and made links between data sets.
- The vast majority of students considered the ethical dimension, making specific reference to each of the methods.

Areas where students struggled

- Some confusion still exists around sampling strategies and the need to carefully consider the location, frequency and timing of the sample. For example, sampling that was actually opportunistic/pragmatic was often described as random. Systematic and stratified sampling were often poorly understood.
- Some students did not allow enough time to generate a representative sample of data. Students frequently indicated that they only had a few hours to collect their primary data. Many did not collect data at different times to investigate temporal change or from multiple locations to investigate spatial patterns.
- Although more students are incorporating statistical analysis in their reports, many did not test the significance of the results, even where it was both appropriate and accurate, and did not interpret it in relation to their study. It was often presented as a technique in isolation and was sometimes based on a tiny sample.
- Many students still find it challenging to include relevant theory from the literature review to interpret their findings. Data analysis was still seen in isolation and the wider context was often ignored. A sizeable proportion of reports made no further reference to the theoretical context after the introduction.
- Evaluations tended to focus on the logistical issues associated with data collection. A greater concentration is required on the success and limitations of the whole investigation, including the reliability of data and validity of conclusions.
- Many students presented their findings in relation to each sub-hypothesis without reaching a final overall conclusion. Some state very firm conclusions based on limited data sets without considering the tenuous nature of the findings.

Quality of assessment

The moderation process presented relatively few issues this year and teachers are to be commended for the quality of marking and administration. Most centres had completed an effective internal standardisation process and provided the appropriate evidence. It was pleasing to note that the vast majority of centres differentiated well between students and made full use of the mark range. Many teachers again provided meaningful and helpful annotation on the candidate record forms as well as on the work itself. This is extremely helpful during the moderation process and we would encourage all centres to provide as much comment as possible to enable moderators to make a more informed assessment. There were some outstanding investigations, deserving of full marks. Centres should use the full range of marks where appropriate. Full marks need not necessarily mean perfection.

Where centres were out of tolerance it was often harsh on the lower marked scripts and over generous on the higher ones. There were virtually no centres where there was highly erratic marking with only limited understanding of the mark scheme. Most centres understood where each sub level was applied to the work, although a few could improve their use of marks where the sub levels didn't really correspond with the overall level or mark.

Once again, the moderating team have commented on the quality of reports submitted and the meticulous accuracy of the marks awarded which represents enthusiasm from students and Geography Departments alike. On behalf of the moderating team we would like to pass on our thanks for your diligence and application to the Unit 3 NEA process in 2024.

Administration

Most centres completed all aspects of administration efficiently and on time and with all of the essential paperwork completed correctly. However, there were some cases this year where the administrative requirements were not completed satisfactorily, leading to delays in moderation. The Centre Declaration Sheet should accompany the scripts submitted for moderation, signed by all teachers involved in the assessment of the work. The Candidate record forms must also be signed by both the student and the teacher to confirm the authenticity of the work, and the teacher must approve the initial student proposal and give suitable feedback, predating the collection of data. A few moderators reported instances of poor administration with missing Centre Declaration Sheets, missing signatures on Candidate record forms, missing or inaccurate student numbers, or different scores on the CRF and Electronic submission. Centres are asked to check all additions and transcriptions very carefully. Note that if the student has received any assistance beyond that given to the class as a whole and beyond that described in the specification, this additional support must be indicated and considered when marking the work.

A small number of centres did not send the original work but had reprinted it to put all into the same format, some reducing to folded A4 to create A5 booklets. Some printed PDF versions with teacher comments in a very wide right-hand sidebar. Unfortunately, these procedures resulted in reduced size diagrams that were illegible, or illustrative material separated from title, or description, or key. Note that at present it is not possible to submit the work electronically.

On an individual basis, students should be encouraged to number the pages of their studies and to give reference numbers to their presentation. A minority of students continue to include in the study, either in appendices or occasionally in the body of the study, the whole set of questionnaires or data recording sheets used. This is not necessary; one example would suffice. Some studies included overlong appendices, which added little or no value to the quality of the submitted work.

Structure and length

Most students could organise the NEA into a logical structure. This usually mirrored the mark scheme. The grossly over-word length issue was less common this year. Where this occurred, it was usually due to an unnecessarily lengthy introduction, Area 1 literary review, or in Area 3 critical analysis. Sometimes this was at the expense of Area 4, evaluation and conclusion, which became somewhat neglected at the end of the investigation report. Securing manageable and focused investigation titles for each student, through detailed discussion at the outset could greatly assist this process. Investigations that were close to 4,000 words in extent tended to have very clear aims, only two or three sub-questions or hypotheses and therefore analysis sections that were more focused.

On occasion, the time taken for data collection was sometimes surprisingly brief, as little as 1 hour, but this was not necessarily commented upon in evaluations. Similarly, data collection took place in a very restricted space and at only one or a very few sites. Conversely, some students made repeated visits to their site(s) over a period of time. Quality of analyses very often reflected these strengths and weaknesses. Some centres scheduled data collection in late November/December which added an extra challenge.

Independence

Centres generally adhered to the requirements of the NEA and showed a clear understanding of both the collaborative and independent phases of the investigation. However, a small minority of centres took insufficient care to ensure that students' work was truly independent. This was most evident when titles and hypotheses varied by just a few words across the cohort, or where the entire cohort chose to do very similar studies, for example on infiltration rates or environmental quality in one small area. Very similar or identical titles may result from discussion or collusion between students. Those with similar aims can collaborate on sampling and data collection and share data, but the work cannot be teacher directed. This sometimes arises after residential fieldwork. To avoid this, residential trips might be best used for providing a fieldwork experience, demonstrating different geographical contexts with possible links to the specification, teaching methods of data collection, sampling, data presentation and analysis skills. Independent investigations are often best developed after residential fieldwork perhaps in a location close to the school or college.

Centres are generally managing the problem of sharing fieldwork data effectively, where students are working in small groups. However, there are some that pursue the use of grouped data too far. Situations where a large number of students centre collect and share data, and even appear to fit their titles retrospectively is not acceptable in an assessment component that requires an independent investigative approach. It can be difficult in these circumstances for moderators to discriminate between students.
It is encouraging to report that many students produced a high standard of work, demonstrating an individual element and a good understanding of the underlying geography applied to a particular place. They produced studies that investigated original topics that were impressively well-planned and researched. Self-reliance and initiative were evident in many studies and where students were allowed the opportunity to choose their location, focus and techniques, true independent decision-making was possible, which often led to inspired and ambitious work. It is a pleasure to read such examples of outstanding scholarship, which achieved marks at the top of the mark range.

Malpractice and the use of Artificial Intelligence (AI)

Centres applied the requirements for Non-Examined Assessment throughout the research and the write-up phase, and there were very few instances of misinterpretation of the regulatory guidelines. There was little evidence of teachers marking work provisionally or providing feedback on student work midway through the process. A minority of centres reported issues relating to the use of Artificial Intelligence in students work. JCQ has provided guidance on this. Inappropriate use of AI to create or enhance student work without acknowledgement of risks is being classed as plagiarism. Teachers must keep student work submitted for assessment as coursework under supervision and must be able to authenticate it as the student's own original unaided work. All use of generative AI programs to conduct initial research, create text, images, sound or video or plan a project must be acknowledged in the work and AI-generated material must be clearly referenced. Students should clearly state the prompt or series of prompts they used, the name and version of the generative AI program used and when it was accessed.

Where teachers suspect plagiarism or inappropriate use of AI they should not authenticate the work and should be prepared to investigate further. Centres are reminded that if any form of malpractice is suspected, AQA will investigate. Where malpractice is found to have taken place a penalty is given dependent on the circumstances and severity of the malpractice.

Themes selected

Across the entry, virtually all potential themes contained within the specification pertaining to fieldwork were explored. Most students chose to investigate aspects of the specification related to aspects of Changing places, Contemporary urban environments, and Coastal systems and landscapes.

In a sample of 340 reports, taken from a wide range of centres and across a range of marks from 12 to 60, the percentages in each broad topic were as follows: Changing Place 36%, Contemporary urban environments 21%, Coastal landscapes 18%, Water and carbon 11%, Ecosystems under stress 6%, Globalisation 3%, Population and environment 2%, Glacial landscapes 1%, Resource security 1%, Hazards 1%. Some straddled across more than one specification theme.

Clone town studies and investigations of sustainability in urban systems were frequently seen this year. There were many investigations comparing two areas in terms of quality of life, standard of living/environment/sense of place, choosing "known" areas of huge diversity. Students often compared media images to the lived experience, or focused on insider/outsider experiences. Evaluative questions examining aspects of urban regeneration were common as were studies that considered environmental and socioeconomic inequalities in contrasting areas. Some very interesting and perceptive studies were undertaken on unusual topics in diverse places-these included a study of how the catholic identity of an Irish village has changed, an investigation of the impact of wildfires in a rural part of Portugal, and investigating the impacts of agricultural intensification on soil quality and fertility in an area of northern France. Sometimes students follow up an area they are interested in, such as football or surfing, but ideas don't fully come to fruition and the outcomes can be poor without teacher guidance at the approval stage. The most popular physical geography topics were coastal erosion, marine sediment transport and deposition, and coastal management. Ecological investigations focussing on plant succession and diversity, usually in a sand dune or salt marsh environment, were also popular. Urban microclimate studies and carbon stores in woodlands were more in evidence than previous years. Investigations based on elements of the water cycle, normally measurement of infiltration, were sometimes less successful, often because methodology and analysis were limited in scope.

There were very few reports of investigation themes that were not connected to specification content.

Titles

Most titles were suitably chosen, with a focus on small scale investigation. Students should avoid titles that begin with 'to find out', 'to explore', or "to investigate" Many titles had a temporal dimension, for example considering urban change through redevelopment or the degree of success of a coastal management scheme, but the appropriate historical data was not usually available, so the investigation simply focused on a snapshot in time, and therefore failed to answer the research question. The many investigations which explored the success or failure of urban regeneration projects never properly established how success was measured or assessed. Clear indicators to measure success, sustainability or impacts should be identified at the outset.

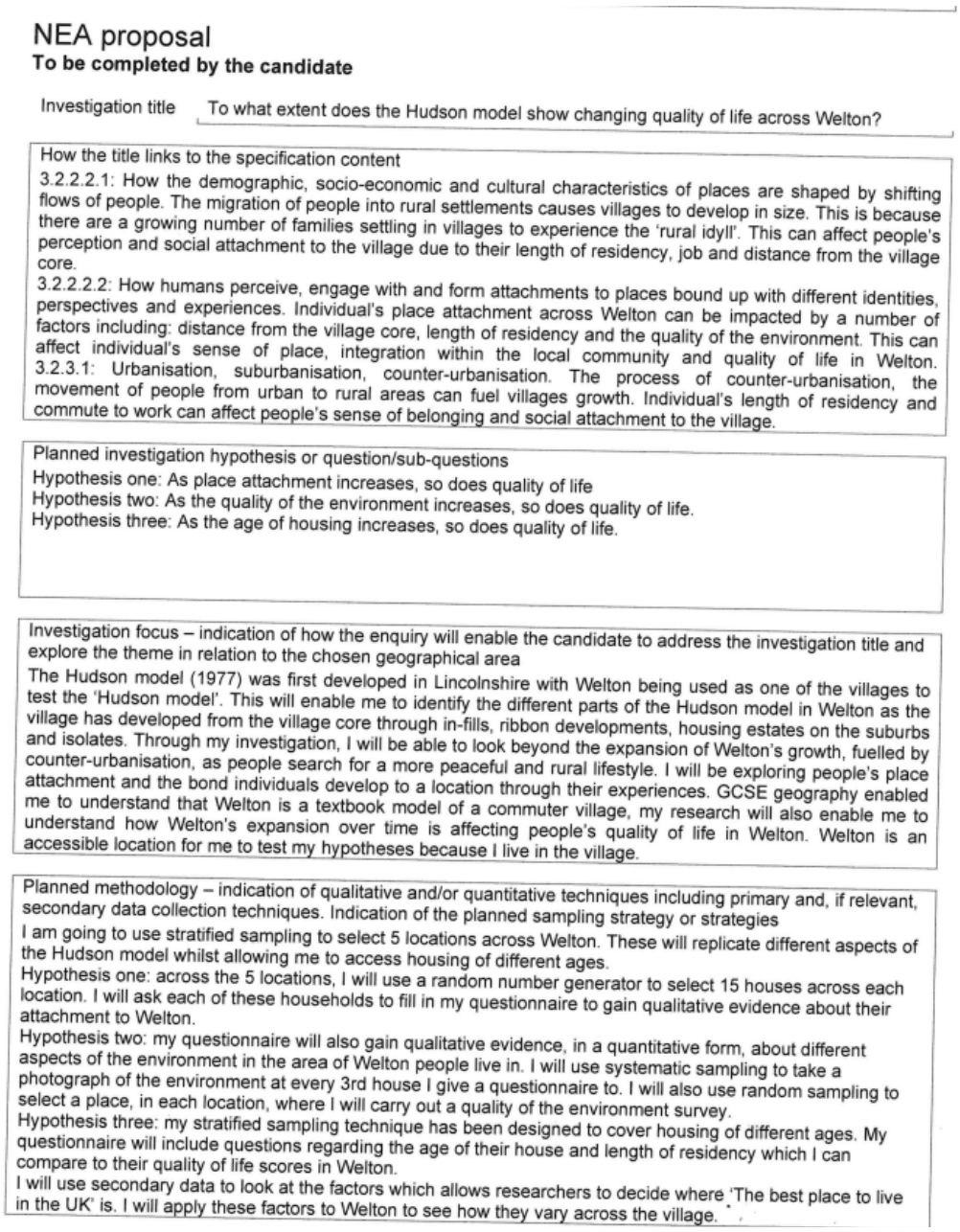
As in previous years, a number of submissions in 2024 were based on broad and unmanageable titles, making the task of answering the question very challenging within the 4000-word guidance. Some titles seen were over ambitious and even unrealistic in their aims, lacking a locational context, such as "Examining the impact of renewable energy sources on reducing carbon emissions" or "Assessing the economic impacts of sea-level rise on coastal communities". The scale of study was sometimes inappropriate, for example "Analysing the impact of air pollution on public health in Manchester" or "Investigating the impact of globalisation on local cultures and traditions in Birmingham".

Candidate Record Forms

The majority of student proposals were clearly articulated, with appropriate titles, hypotheses or research questions, locational focus, methodologies and sampling strategies. However, CRFs did show variation in the way they were completed by students and commented upon by teachers. Some students could have had greater success had shortcomings such as, too broad a title, too many hypotheses, tautologous aims, difficulties in planned data collection been pointed out. It is vital that teachers use the opportunity to provide feedback at the initial approval stage, as it is not possible to give specific advice at a later point in the process.

There is a frequently a close correlation between the detail and substance of the CRFs and the quality of the ensuing work. The proposal is a working document and a way of managing adaptation within the enquiry rather than an exact blueprint, and students may make minor changes to their plans as the enquiry progresses. In some cases, the number of methods, sampling strategies and even the number of hypotheses may alter as the student reflects on the task in hand. This is perfectly acceptable, and it is not necessary for a further CRF to be submitted.

This example of a Candidate Record Form shows specification links that are justified; a title with an evaluative question, and a theoretical and locational context; three linked sub-hypotheses; a clear focus and methodology linked to each of the hypotheses, with sampling strategies indicated.



NEA proposal

To be completed by the candidate

Investigation title: To what extent does the Hudson model show changing quality of life across Welton?

How the title links to the specification content

3.2.2.2.1: How the demographic, socio-economic and cultural characteristics of places are shaped by shifting flows of people. The migration of people into rural settlements causes villages to develop in size. This is because there are a growing number of families settling in villages to experience the 'rural idyll'. This can affect people's perception and social attachment to the village due to their length of residency, job and distance from the village core.

3.2.2.2.2: How humans perceive, engage with and form attachments to places bound up with different identities, perspectives and experiences. Individual's place attachment across Welton can be impacted by a number of factors including: distance from the village core, length of residency and the quality of the environment. This can affect individual's sense of place, integration within the local community and quality of life in Welton.

3.2.3.1: Urbanisation, suburbanisation, counter-urbanisation. The process of counter-urbanisation, the movement of people from urban to rural areas can fuel villages growth. Individual's length of residency and commute to work can affect people's sense of belonging and social attachment to the village.

Planned investigation hypothesis or question/sub-questions

Hypothesis one: As place attachment increases, so does quality of life

Hypothesis two: As the quality of the environment increases, so does quality of life.

Hypothesis three: As the age of housing increases, so does quality of life.

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

The Hudson model (1977) was first developed in Lincolnshire with Welton being used as one of the villages to test the 'Hudson model'. This will enable me to identify the different parts of the Hudson model in Welton as the village has developed from the village core through in-fills, ribbon developments, housing estates on the suburbs and isolates. Through my investigation, I will be able to look beyond the expansion of Welton's growth, fuelled by counter-urbanisation, as people search for a more peaceful and rural lifestyle. I will be exploring people's place attachment and the bond individuals develop to a location through their experiences. GCSE geography enabled me to understand that Welton is a textbook model of a commuter village, my research will also enable me to understand how Welton's expansion over time is affecting people's quality of life in Welton. Welton is an accessible location for me to test my hypotheses because I live in the village.

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

I am going to use stratified sampling to select 5 locations across Welton. These will replicate different aspects of the Hudson model whilst allowing me to access housing of different ages.

Hypothesis one: across the 5 locations, I will use a random number generator to select 15 houses across each location. I will ask each of these households to fill in my questionnaire to gain qualitative evidence about their attachment to Welton.

Hypothesis two: my questionnaire will also gain qualitative evidence, in a quantitative form, about different aspects of the environment in the area of Welton people live in. I will use systematic sampling to take a photograph of the environment at every 3rd house I give a questionnaire to. I will also use random sampling to select a place, in each location, where I will carry out a quality of the environment survey.

Hypothesis three: my stratified sampling technique has been designed to cover housing of different ages. My questionnaire will include questions regarding the age of their house and length of residency which I can compare to their quality of life scores in Welton.

I will use secondary data to look at the factors which allows researchers to decide where 'The best place to live in the UK' is. I will apply these factors to Welton to see how they vary across the village.

Centres are reminded that AQA offers an advisory service for teachers to contact their advisor for any queries relating to the delivery of this NEA. This offers teachers the chance to gain input from senior advisers on the suitability of proposals, as well as obtaining guidance on other aspects of the NEA.

The written report

The advised structure to the written report is that it should be linked closely to the mark scheme. It is recommended that it follows a logical sequence, starting with the CRF, and covers the four areas of the mark scheme. Some students submitted work that only partially covered the four areas, or alternatively combined several of the strands under a single heading. In the best work seen the enquiry route was obvious from the outset, and the work maintained a rigour and clear sense of purpose with the issue under investigation being firmly rooted in geography.

Area 1 Introduction and preliminary research

Moderators reported that where students had achieved the highest marks there was evidence of a clear link to the specification content and a strong theoretical and comparative context. Alongside the theoretical basis of the investigation, many students provided justification for the locational setting of their investigation using a series of GIS maps at different scales. However, this was not consistent across the cohort and there is still a need for students to provide a rationale for their sub-hypotheses or sub-questions, in terms of their relationship to the underlying theory, and how they will assist in directly addressing the selected key question. In some of the poorer scripts students provided generic background that bore little reference to theory or context. Literature reviews were used by the majority of students, but while most had a list of literature sources in their appendix, these were sometimes limited to website links, such as Wikipedia and Google. The better reports made excellent use of literature throughout their work, with relevant sources clearly identified in the text, using a recognised system such as Harvard. An effective introduction will be quite short – perhaps only 500-750 words.

The example below demonstrates the identification of relevant parts of specification content, with a rationale or justification for each link:

'To what extent is it easier being green in urban compared to rural locations.'

In the A-level Geography AQA Specification it states topics with a focus on Sustainability which are as followed:

3.1.6.1 Ecosystems and sustainability- This specification links well to my title, because it focuses on the impact of population growth and economic development on sustainability which will affect residents' potential of living a sustainable lifestyle and how easy it is for them to do so especially in different locations.

3.2.3.8 Sustainable urban development- Additionally, this part of the specification links to my focus question, which highlights the impact of urban areas on local and global environments. Sustainable urban development will ease the opportunities of being sustainable in urban settlements.

3.2.5.4 Energy Security- This part of the specification identifies the elements of renewable energy such as solar panels. Which is something I will be counting during my investigation to compare sustainability between urban and rural areas and see how sustainable infrastructure contrasts between locations.

Therefore, I will focus my hypothesis and research areas on opportunities available, prominent infrastructure and whether perceptions differ which will help answer how this affect the easiness and potential of being sustainable. I will then apply these sustainability factors to an urban location, Lincoln, and a rural location, Reepham which will help me determine whether it is easy being sustainable in an urban compared to rural location.

Both urban and rural locations are seen to provide challenges in achieving sustainability, which is posing a threat to the local and global environment. Sustainability can be classed as 'the ability to use natural resources responsibly, so they support both present and future generations' which will be harder to achieve in different locations.

In the following study the student develops 4 sub hypotheses related to the research question to what extent will deciduous woodland provide a higher biodiversity than coniferous woodland. The report includes footnotes linked to literary sources and makes references to several comparative studies which have been carried out previously.

Rationale for each hypothesis:

To determine whether my primary hypothesis is correct I have divided my research into 4 different sub hypotheses that I believe would have an effect on the biodiversity in each type of woodland: Coniferous and deciduous. These 4 factors that could have an effect on the biodiversity are infiltration rate, soil moisture, pH level and light intensity.

Rationale for main hypothesis:

The deciduous woodland will provide a higher biodiversity than the coniferous woodland.

- Deciduous woodlands provide a better environment for a significant plant biodiversity to occur. The diversity in structures that it provides is quite contrasting to one of a coniferous woodland, this is seen with a variety of ground cover like leaf litter and fallen dead wood.[7] Leaf litter is a significant factor in increasing the biodiversity of the deciduous woodland surface. Leaf litter is an important component of healthy soil, this is because it releases nutrients into the soil as it decomposes as well as it helps the soil to retain moisture.[8] These conditions that the leaf litter provides to the woodland are ideal for different flora to grow and survive, as well as being well suited to accommodate new plant seedlings to grow. Furthermore, the ecosystem also has ideal conditions for species of fungi to grow. Structures that are often found in deciduous woodlands, such as leaf litter and fallen dead and decaying wood are provide a perfect habitat for fungi to grow. Fungi takes up the nutrients produced by these structures. Within the woodland they work along side other species of flora to keep the

7. Barnsley biodiversity (n.d.). *Deciduous woodland features.* http://www.barnsleybiodiversity.org.uk/deciduouswoodland_features.html - :~:text=Deciduous woodland features&text=A complex structure of trees[Accessed 2024].

8 Lin, K. (2012). Seasonal Science: What Lurks in the Leaf Litter? Scientific American. https://www.scientificamerican.com/article/bring-science-home-leaf-litter-biodiversity/ - :~:text=Leaf litter is an important[Accessed 2024].

ecosystem stable, an example of this is how they protect the tree roots from parasites that are in the soil, and in return they get the sugars they require from the trees.Fungi that are saprophytic, are especially known to live on dead/dying wood. They are influential within the woodland ecosystem as they break down the organic matter, which unlocks a mass of nutrients for the other plants in the woodland.[9] Higher soil moisture content in deciduous woodland is largely a result of the leaf litter that is produced when the leave's ability to photosynthesise dwindles along with the levels of sunlight and the temperature. These higher quantities of water found within the soils of deciduous woodland provide an environment that is ideal for different variants of moss to grow. Mosses don't require much to be able to grow and are primarily found in places that are very moist. They also require water for their reproduction.[10] These examples of different species highlight how a deciduous woodland is likely to have a higher plant biodiversity than a coniferous woodland as the conditions that it provides are more suited to a wider variety of species than what a coniferous woodland does.

Rationale for sub hypotheses:

1) **The pH levels of the soil will be more neutral in a deciduous woodland than in a coniferous woodland where the soils will be slightly acidic.**

- Coniferous trees naturally cause a more acidic soil than deciduous trees. In a study that was conducted it was found that the litter collected from coniferous stands had a significantly lower pH than the deciduous litter collected from near the deciduous stands.[11] This is due to a higher concentration of calcium found in the deciduous litter. Calcium is an alkali and therefore the litter isn't very acidic. The soil pH in a woodland that was closely monitored was seen to become more acidic over a 30-year period after coniferous trees were planted. This was due to the coniferous trees that higher amounts of calcium in their leaves, caused the pH of the litter and the soil to be more acidic. [12] When the evergreen conifers shed their needles, the needles fall to the surface and build up into a a carpet of needles. The needles are then decomposed by the fungi, resulting in the leaching out of healthy nutrients for the trees. In addition, to the nutrients that the needles supply they also release a high amount of H^+ ions into the soil, causing the soil pH to drop and become more acidic.[13]

2) **The light intensity on the woodland floor will be greater in deciduous woodlands compared to coniferous woodland.**

The light intensity observed on woodland floors in both coniferous woodlands and deciduous woodlands fluctuates throughout the year, due to both canopy density as well as weather being season dependant. However, for several months in the UK broadleaf woodlands (deciduous woodlands) in the Uk tend to have higher light levels hit the woodland floor than coniferous woodlands. [14] This is supported with how the vertical structures of British woodlands act; coniferous woodlands are often tightly packed together. This arrangement leads to the canopy of c woodlands being incredibly dense, massively reducing the light that can hit the floor.[15] This is coupled with the fact that evergreen conifers have no period within the year in which they lose all their needles, this significantly contributes to the obstruction of light on coniferous woodland floors.[14] Deciduous trees, such as broadleaves trees, lose their leaves for a multitude of reasons, which all accumulate to an increased amount of light that hits the woodland surface, some of these include: the tree drops its leaves so it uses less energy through the winter; conserves moisture within the trunk as well as a lack of leaves allows for the wind too blow through the branches putting less strain on the branches.[16]

3) **A deciduous woodland will have a greater level of soil moisture than a coniferous woodland.**

- The soil moisture in a coniferous woodland should be visibly contrasting with deciduous woodland soil, which should have a much higher soil moisture content than that of a coniferous woodland soil. There are many reasons for why this may be, one of which is that of a reduced interception in deciduous woodlands may cause a higher saturation of water in deciduous woodland soils. Similar to light intensity, the density of coverage in the canopy dictates what hits the woodland surface. In a coniferous woodland there is likely to be much more interception occurring as the canopy is much denser whereas the deciduous woodland canopy is less dense. However, some

9 Heart of England Forest (n.d.). *Fungi in the Forest*. https://heartofenglandforest.org/news/fungi-forest - :~:text=Fungi aid the uptake of[Accessed 2024].

10 Anon, (n.d.). *Mosses in woodlands https://www.woodlands.co.uk/blog/flora-and-fauna/mosses-in-woodlands/* [Accessed 2024].

11 Burgess-Conforti, J.R., Moore, P.A., Owens, P.R., Miller, D.M., Ashworth, A.J., Hays, P.D., Evans-White, M.A. and Anderson, K.R. (2019). *Are soils beneath coniferous tree stands more acidic than soils beneath deciduous tree stands?* Environmental Science and Pollution Research, 26(15), pp.14920–14929. Doi: https://doi.org/10.1007/s11356-019-04883-v

12 Shaw, J. (2018). *Do Evergreens Change the pH Balance of Your Soil?* Trees Unlimited. https://treesunlimitednj.com/do-evergreens-change-the-ph-balance-of-your-soil/ [Accessed 4 Jan. 2024].

13 Anon, (n.d.). *Coniferous/Broad Leaved Woodlands – Learning in the Leaves.* https://learningintheleaves.co.uk/coniferousbroad-leaved-woodlands - :~:text=Fungi slowly decomposes these needles [Accessed 18 Feb. 2024].

14 Countrysideinfo (n.d.). *Structure in coniferous & broadleaf.* http://www.countrysideinfo.co.uk/woodland_manage/struct2.htm[Accessed 2024].

15 Learning in the leaves. (2024). Woodland Ecological https://learningintheleaves.co.uk/woodland-ecological-structures - :~:text=Coniferous Forests – In coniferous [Accessed 18 Feb. 2024].

16 Sandie, C. (2020). *Why Do Trees Lose Their Leaves?* Forestry and Land Scotland. https://forestryandland.gov.scot/blog/trees-in-autumn - :~:text=There are several reasons why [Accessed 2024].

interception will occur in a deciduous woodland that means that the soil will not become too saturated. This is provided by the shrubs that are found on the surface. Another way in which soil moisture will be increased is by the storage of water by mosses. Mosses act as a sponge on the woodland surface, absorbing lots of water. Whilst some mosses can only absorb small volumes of water at a time, sphagnum mosses can absorb up to 30 times their weight. The absorption qualities of moss allow the storage of water in woodlands as well as help with reduction in the build up water by providing water infiltration.[17] Leaf litter in deciduous woodlands could also contribute to a higher soil saturation, as they also absorb a lot of moisture.

4) The infiltration rate will be lower as a result of a deciduous woodland rather than a coniferous woodland.

- The infiltration rates in coniferous and deciduous woodlands should be contrasting but will both by around 60 times higher than open grassland provides. This is because, soils in grassland are more compact whereas soils in woodland are much more open and less compacted.[18] The infiltration rate of soil will be higher in a deciduous woodland than in a coniferous woodland due to increased vegetation. Vegetation is increased in deciduous due to a variety of factors, like light intensity. The vegetation helps to slow the movement of surface run off; this allows more time for the water to seep into the soil.[19] Vegetation provides roots that extend into the soil of the deciduous woodland, these roots create cracks within the soil, allowing for an increase infiltration rate. Additionally, vegetation also reduces the soil compaction, which also helps increase the rate of infiltration in deciduous woodlands.[20] Increased infiltration rates will also act as a positive feedback mechanism as less saturation of water within the soil will lead to increased number of plants on the woodland surface, which will cause infiltration rates to be faster.

There are still some recurring spatial context issues. Students should aim to include a clear focus on the location(s) under investigation. This can be achieved, for example, by providing a regional map and O.S. extract with sites marked precisely where the data was actually collected, or a street map of an urban area with the locations of surveys pinpointed, or where questionnaires were conducted. The (partial) example below demonstrates this (although scale is not indicated):

Location of the study:

Darlton 2/Hidden Quarry:

Darlton 2 also known as Hidden quarry is located in the Peak District National Park near the village of Stoney Middleton. This is an ideal place for my study as it provides a variety of habitats in one area which was previously quarried. It has also had minimal disturbance since being quarried as it is hidden from the road and isn't a well-known place. If these places are abandoned and left for habitats to grow and to be used for recreational activities, then it is completely justifiable to use this as my data collection site.

Coombs Dale:

This is my control area which is located around 2km away from Darlton 2/Hidden Quarry nearby to the villages of Stoney Middleton and Calver in the Peak District National Park. Coombs Dale is a designated Site of Special Scientific Interest (SSSI), this provides a perfect location for my study as it has had minimal human intervention but has instead been left undisturbed so natural succession can occur.

Map of locations:

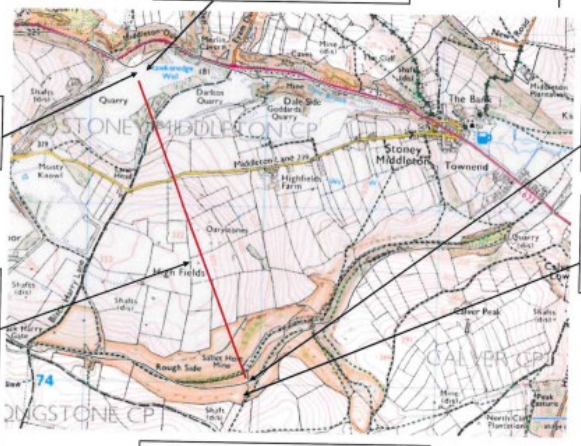


Figure 6 – OS Map of data collection site

1647

Aerial view map of Darlton 2/Hidden Quarry:

Figure 7 – Aerial map of data collection site at Quarry

8

Area 1 Summary

Area 1a Aims and research questions. Students performed well when they had:	Aims and research questions. Students performed less well when they had:
• precise links to the specification, with a suitable rationale or justification • 2-3 sub questions or hypotheses, all connected to the central theme of investigation • a research question with a clear locational and theoretical context • an independent choice of title, based on a topic they were genuinely interested in, capable of being tested at an appropriate scale, using evidence collected in the field. • opportunity to select from a range of different contexts, with the chance to revisit locations to collect repeat measurements/observations.	• inappropriate or generalised links to the specification • a multi-hypothesis approach or hypotheses not capable of being tested • sub-hypotheses or sub-questions that were not connected • titles that were too broad or ambitious, or truisms, or based around a data collection technique • titles that were similar across the whole cohort because they were restricted to one context or environment. • titles that were largely dependent on collection of secondary data

Area 1b Literature review/theoretical contexts. Students performed well when they had:	Literature review/theoretical contexts. Students performed less well when they had:
• a few well-chosen sources that were closely linked to the investigation theme. • fully acknowledged sources using footnotes and bibliography • selectively quoted from research information, adding their own interpretation and analysis • researched comparative contexts where fieldwork on similar themes had been conducted • provided a clear locational context for the study	• general sources that were not clearly linked to the investigation. • failed to acknowledge sources • indiscriminately cut and paste chunks of text or research information • included lengthy and irrelevant background description of study area • limited or superficial coverage of the theoretical context • ignored comparative contexts • not provided a spatial context to the investigation

Area 2 Methods of field investigation

The stronger investigations demonstrated evidence of a well-designed planning phase, often including a piloting strategy, careful selection of a range of 3-6 appropriate methods, clear indication of the number of sites visited and surveys undertaken, explanation of the sampling techniques involved and justification of the methods being adopted in relation to the purpose of the enquiry. Where the study is split into sub-questions or sub-hypotheses it is good practice to link the method(s) to each in turn.
The better scripts justified the sites selected or questions asked within a questionnaire, and linked different items of data to the underpinning hypotheses or questions. Sampling was often referred to, but the different strategies were not always understood. Awareness of the difference between systematic and stratified was often lacking. Sample size was difficult to determine for many.

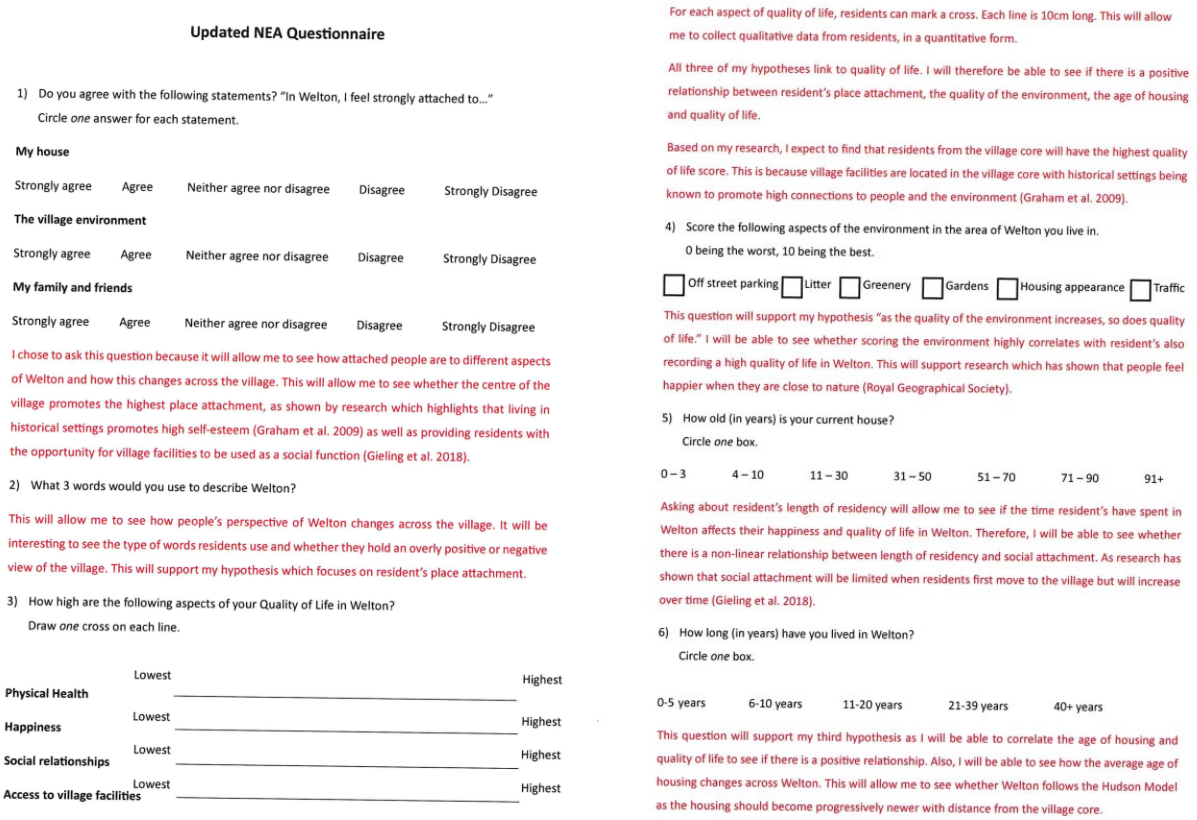
The best explained their methods in a replicable way although some clearly relied on what they had done at a field centre or as part of a group. A number of students relied on well-established surveys for EQS derived from websites and field centres-there is often scope to individualise the data recording sheets, making them specific to the purpose of the enquiry.

The amount of data collected varied significantly – from those where there was an inadequate amount to draw conclusions (2 different sites, 5 questionnaires for example), to those who have many data items and large, representative sample sizes. There is a balance between too little and too much but students ought to aim for 10 study sites in terms of subsequent processing; 20 plus on questionnaires as a minimum. It is recognised that face to face questionnaire data is time consuming to collect and not always successful. Many surveys are now completed online, sometimes with limited options for responses. A lot are closed questions with yes/no alternatives, which is not really appropriate at GCE. Whenever a questionnaire is used it would be sensible to provide an annotated copy in an appendix; the annotations can be used to justify the choice of questions.

Some students used methodology tables to explain and justify their methods. They can have the advantage of covering each aspect of the mark scheme as along as the headings are wide ranging, but they can be constraining, particularly for more able students. They are often descriptive rather than explanatory, and the separation under different headings can limit the quality and depth of discussion. Extended writing for this section is often preferable and allows for greater discussion and
justification of the methods adopted as well as the sampling framework. A (partial) example is shown below. Note that problems and improvements would be assessed as part of 4b evaluation.

Technique- Primary and Secondary, Quantitative and Qualitative	Sampling type and reason	Methods- When, where, Step by Step, Frequency, Equipment	Justification of Method- how it will help answer the hypothesis	Problems/Limitations	Improvements
Land use survey- a primary technique to collect qualitative data to show what the land within Cottingham is used for.	Random Sampling- Create a grid to split Cottingham into sections, then use a random number generator to generate 2 numbers to create a set of coordinates; repeat 10 times to perform land use survey at 10 different sites Systematic sampling- Every 2 sites	Equipment Used: -30m measuring tapes to create transect -Notepad to draw table and record results 1.Create a transect in sample area. 2. Along the transects every 5m record the land use; tallying it in a table, using the RICEPOTS system of categorising 3. This is repeated in all 10 different sites Will be performed during the day for safety and able to see things more clearly.	Land use is a main factor is causing flooding- changing from natural environments to urban areas that water falls straight to the ground and not bae to infiltrate through impermeable surfaces.	Is very time consuming if the sample area is quite large- lots of buildings and land to record. Sometimes there is no obvious use of the land/buildings, and it could have multiple uses making therefore cannot be recorded into one category.	It would be quicker and more efficient to perform it in with others in a group, so it doesn't take multiple days. Could create my own category system to add unclear land use and areas with multiple uses
Measuring Infiltration Rates- a primary technique to collect quantitative data to compare infiltration of water in different	Random sampling – Create a grid to split Cottingham into sections, then use a random number generator to generate 2 numbers to	Equipment used: -2x 30m measuring tape -Stopwatch -30cm ruler -Infiltration tube -Block of wood -Hammer -Water Container -Notepad and pen to draw table and record results	Through this I will have a range of means of infiltration rates in different areas of water. These results can be compared to find	Results can be affected by recent weather events, specifically rain in recent days or on the day I perform my investigation. Rain will cause	I need to make sure to check weather conditions on the day and days before I aim to perform my investigation to ensure no

Annotated questionnaires can be a useful way of justifying the questions posed and show the link to investigation sub-questions or hypotheses. This example shows an adapted questionnaire that has changed following a pilot study:



Updated NEA Questionnaire

1) Do you agree with the following statements? "In Welton, I feel strongly attached to..."
Circle *one* answer for each statement.

My house

Strongly agree Agree Neither agree nor disagree Disagree Strongly Disagree

The village environment

Strongly agree Agree Neither agree nor disagree Disagree Strongly Disagree

My family and friends

Strongly agree Agree Neither agree nor disagree Disagree Strongly Disagree

I chose to ask this question because it will allow me to see how attached people are to different aspects of Welton and how this changes across the village. This will allow me to see whether the centre of the village promotes the highest place attachment, as shown by research which highlights that living in historical settings promotes high self-esteem (Graham et al. 2009) as well as providing residents with the opportunity for village facilities to be used as a social function (Gieling et al. 2018).

2) What 3 words would you use to describe Welton?

This will allow me to see how people's perspective of Welton changes across the village. It will be interesting to see the type of words residents use and whether they hold an overly positive or negative view of the village. This will support my hypothesis which focuses on resident's place attachment.

3) How high are the following aspects of your Quality of Life in Welton?
Draw *one* cross on each line.

Physical Health Lowest _____ Highest

Happiness Lowest _____ Highest

Social relationships Lowest _____ Highest

Access to village facilities Lowest _____ Highest

For each aspect of quality of life, residents can mark a cross. Each line is 10cm long. This will allow me to collect qualitative data from residents, in a quantitative form.

All three of my hypotheses link to quality of life. I will therefore be able to see if there is a positive relationship between resident's place attachment, the quality of the environment, the age of housing and quality of life.

Based on my research, I expect to find that residents from the village core will have the highest quality of life score. This is because village facilities are located in the village core with historical settings being known to promote high connections to people and the environment (Graham et al. 2009).

4) Score the following aspects of the environment in the area of Welton you live in.
0 being the worst, 10 being the best.

☐ Off street parking ☐ Litter ☐ Greenery ☐ Gardens ☐ Housing appearance ☐ Traffic

This question will support my hypothesis "as the quality of the environment increases, so does quality of life." I will be able to see whether scoring the environment highly correlates with resident's also recording a high quality of life in Welton. This will support research which has shown that people feel happier when they are close to nature (Royal Geographical Society).

5) How old (in years) is your current house?
Circle *one* box.

0 – 3 4 – 10 11 – 30 31 – 50 51 – 70 71 – 90 91+

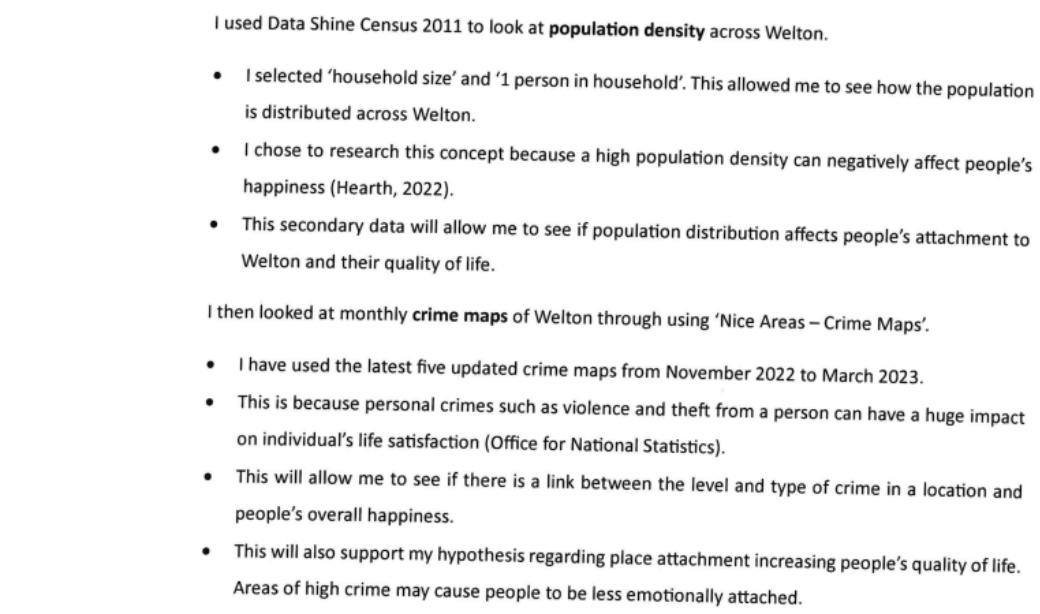
Asking about resident's length of residency will allow me to see if the time resident's have spent in Welton affects their happiness and quality of life in Welton. Therefore, I will be able to see whether there is a non-linear relationship between length of residency and social attachment. As research has shown that social attachment will be limited when residents first move to the village but will increase over time (Gieling et al. 2018).

6) How long (in years) have you lived in Welton?
Circle *one* box.

0-5 years 6-10 years 11-20 years 21-39 years 40+ years

This question will support my third hypothesis as I will be able to correlate the age of housing and quality of life to see if there is a positive relationship. Also, I will be able to see how the average age of housing changes across Welton. This will allow me to see whether Welton follows the Hudson Model as the housing should become progressively newer with distance from the village core.

When explaining the use of secondary data, students often gave brief or superficial reasons, even when primary data sources were outlined in detail. Others explained the use of secondary sources in relation to the purpose of the enquiry, as shown in this example:



I used Data Shine Census 2011 to look at **population density** across Welton.

- I selected 'household size' and '1 person in household'. This allowed me to see how the population is distributed across Welton.
- I chose to research this concept because a high population density can negatively affect people's happiness (Hearth, 2022).
- This secondary data will allow me to see if population distribution affects people's attachment to Welton and their quality of life.

I then looked at monthly **crime maps** of Welton through using 'Nice Areas – Crime Maps'.

- I have used the latest five updated crime maps from November 2022 to March 2023.
- This is because personal crimes such as violence and theft from a person can have a huge impact on individual's life satisfaction (Office for National Statistics).
- This will allow me to see if there is a link between the level and type of crime in a location and people's overall happiness.
- This will also support my hypothesis regarding place attachment increasing people's quality of life. Areas of high crime may cause people to be less emotionally attached.

Area 2 Summary

Area 2. Methods of field investigation. Students performed well when they had:	Area 2. Methods of field investigation. Students performed less well when they had:
• fully understood sampling strategies and justified them for each method in relation to the purpose of the investigation. • collected a large sample of primary data which would enable meaningful conclusions to be drawn. • used relevant secondary data sources in support of primary data collected in the field. • selected a range of methods which directly addressed the sub-questions/hypotheses • carried out pilot surveys which often gave clear insight into the feasibility and timings of the investigation, as well offering a practical opportunity to trial the technique. • devised own recording sheets and tables for outlining methodology • explained methods fully without any gaps. • given careful consideration to the timing and frequency of sampling. • allowed for both temporal sampling (repeat measurements and observations) and spatial sampling (collecting data from a range of locations) • used photos to illustrate data collection and locate sample sites on a map • inserted examples of data recording sheets with explanations or annotations of the questions posed or data headings	• failed to justify the sample size or method. • a limited range, often only one or two simplistic techniques. • (or) a large number of data capture methods executed poorly, some of which were not helpful to the enquiry • collected data in large groups and relied heavily on a single data set • relied largely on secondary data, with minimal data collected in the field • misunderstood sampling strategies • selected methods indiscriminately and inappropriately • used recording sheets obtained from field centres or taken directly from secondary sources • given partial and incomplete explanation of methodology • tiny or unrepresentative samples. • too much (inappropriate) data. • been given credit given for methods that were not subsequently executed in the field.

Area 3 Methods of critical analysis

The majority of students were able to produce a suitably wide range of cartographical and graphical techniques to present and analyse their data. These ranged from the use of those available in Microsoft Excel to some thoughtful and appropriate use of GIS packages. Students should aim to produce techniques that meet the basic presentation standards; sometimes they lacked clear titles, labelled axis, and appropriate scales. There is still an overreliance on multiple bar and pie charts to show simple information that summarise limited questionnaire answers.

There was some suitable application of statistics but some students do not always understand their use, for example seeing Chi Squared as testing for correlation instead of discrepancies between the data distributions that are observed and those that are expected. Some did not realise the shortcomings of sample sizes that were too small, and a large number failed to consider significance when completing correlation or chi shared tests. Quoting the final outcome of an analytical technique is important, but students should indicate what it means in the broader geographical context of the investigation. Qualitative techniques were used in certain investigations, particularly for changing place studies. More complex techniques of analysis such as well annotated photographs, or colour coding and graphical representation of interview transcripts were extensively used. Mapping with superimposed symbols and annotations, often helped to display more than one data item simultaneously in a spatial context. Many students used techniques such as polarising, theming, categorising or making linkages when coding text as part of qualitative analysis. Note however that there is only limited credit for simply downloading maps from the census or crime data websites.

Most students effectively analysed and interrogated their data and discussed the main trends and patterns in the same sequence as the questions/hypotheses. Many were aware of anomalies and cross-referenced different sources, interpreting the evidence by applying theory from the earlier literature review. The best scripts included logical and organised interpretations, with precise and plausible reasons for the results obtained. Poorer scripts simply described the results, as depicted in each technique of data presentation, rather than being driven by the hypotheses. A limited literature review at the start clearly has implications for this section. In the weaker scripts, the underpinning theory was not integrated into the analysis, nor was it used to help explain the findings. Often what was missing from the interpretation was the requirement to indicate the degree to which the data is representative. This should form part of the critical examination of the field data. Similarly, only limited attention was given to the accuracy of data, which is also part of this strand.

All techniques should be linked to the hypotheses or research questions stated in the introduction. This series of annotated photographs illustrates links between the hypotheses and the features shown. Note that there is some credit for 3a presentation and analysis as well as 3b interpretation.

Hypothesis 1 – The removal of historic and cultural services in the Cornhill quarter has altered the sense of place.

Hypothesis 2 – The pedestrian count in a regenerated area will be higher than an area that has not been regenerated.

Hypothesis 3 – The Cornhill regeneration scheme has increased the quality of the built environment from a run-down environment.

Figure 11 - Location 1 – Cornhill Quarter

Improved built environment incorporating the original historic style of the Cornhill Quarter.

Wide variety of greenery and plants to add to the environment and atmosphere.

Sufficient seating areas for food or generally resting.

New shops open including chain stores and well-known brands.

Figure 12 – Cornhill Quarter

Large seating area could increase people in the area.

An area for entertainment a wide selection of activities for kids.

Decorations showing different events going on in the area adding to more services and an area of entertainment.

Figure 13 - Location 2 – High Street

More modern buildings showing the investment in the area.

Flowers to add to the quality of the environment.

High number of pedestrians

Figure 14 - Location 3 – end of high street

More local businesses in this area than Cornhill Quarter and high street.

Low number of pedestrians

Use of seating area in the centre that meant it had a higher rating than everything else in regeneration survey.

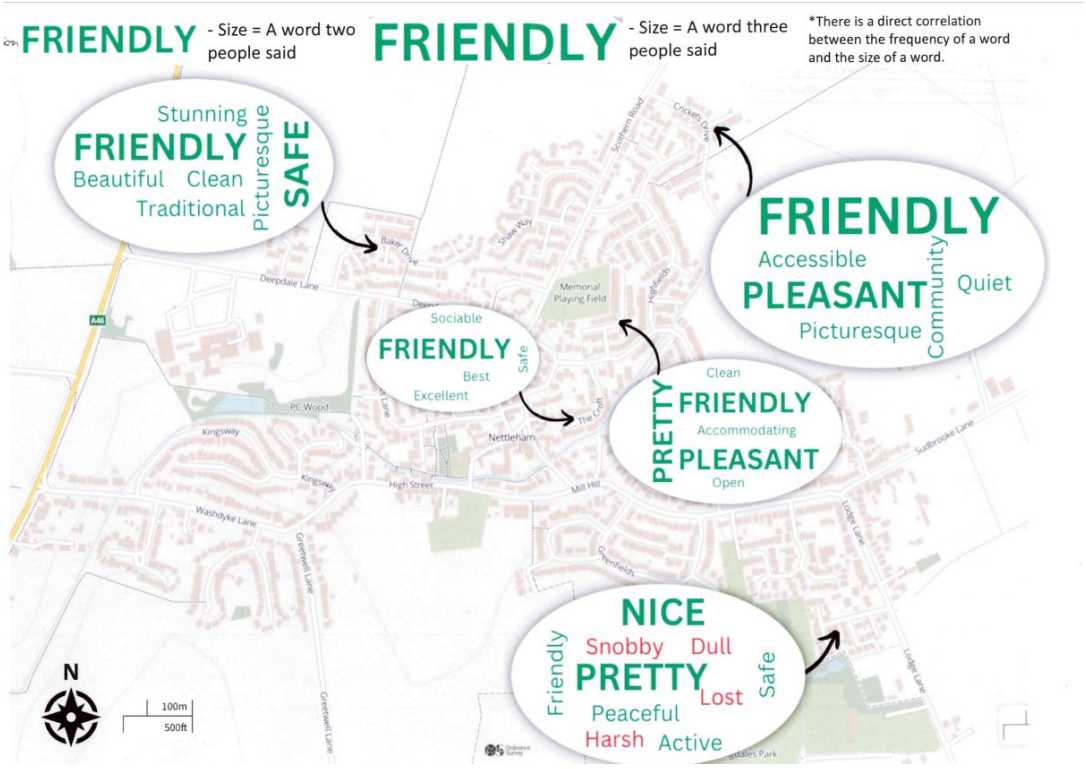
Figure 15 - Location 4 – St Marks

Large numbers of shops closed.

Moves area from main area so less busy than high street.

16

This example of located word clouds attempts to illustrate some spatial variation within a village. The sample size is small and the scale not entirely clear, but subsequent analysis made good use of the qualitative data.



Where statistical tests were used, the best studies explained why they were used, showed evidence of the calculations made and used the results to inform the analysis. Where there was good understanding, the use of significance was employed and the results interpreted with regard to the hypothesis. This example has (just) sufficient readings for a Spearman rank correlation test. Note that presentation, analysis and interpretation are linked together.

Figure 23: Scatter graph – Correlation between percentage coverage of heather and infiltration rate in the North Yorkshire Moors

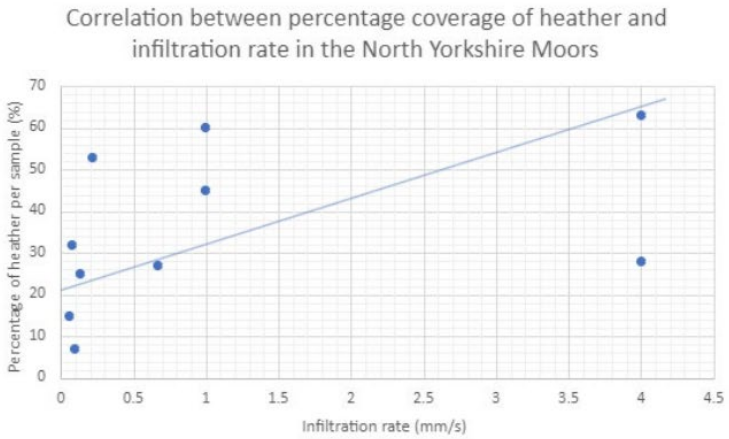


Figure 17: Spearman rank correlation between percentage coverage of heather and infiltration rate in the North Yorkshire Moors (with critical values test)

North Yorkshire Moors								
Sample	Infiltration rate (mm/s)	Rank	Percentage of heat	Rank	d	d square		
1	0.222	6	53	3	3	9		p= 1 - 6 * d^2/n(n^2 - 1)
2	1	3.5	45	4	0.5	0.25		
3	0.078	9	32	5	4	16		p=1-6 * 58/10(100 - 1)
4	1	3.5	60	2	1.5	2.25		
5	0.096	8	7	10	2	4		p=0.648484849
6	4	1.5	63	1	0.5	0.25		
7	4	1.5	28	6	4.5	20.25		
8	0.059	10	15	9	1	1		
9	0.133	7	25	8	1	1		
10	0.667	5	27	7	2	4		
						58		

As a result of the outcome from figure 16 from my initial spearman rank test, I decided to conduct the same test to determine whether there was a significant relationship between infiltration within the 10 samples of the North Yorkshire Moors and the percentage of heather found within the 10 quadrat samples of the same sites. I initially presented this data within a scatter graph displayed within figure 23. This figure clearly shows a weak yet positive correlation between the two variables, due to the spread of points, the most noticeable points being those that reach 4mm/s in terms of infiltration rates and up to 63% in heather distribution. In comparison, there appears to be a cluster of results surrounding the slower rates of infiltration of 0.5mm/s and less, alongside less than 40% coverage of heather. This suggests that as the percentage of heather per quadrat increases, the rate of infiltration becomes faster (increases). This pattern could have been formed through larger parts of the heather acting as a store for interception, protecting the soil beneath from rainwater and therefore oversaturation, allowing for faster rates of infiltration during my investigation. Equally, the lower percentages of heather and lower infiltration rates may prove the significance of heather to act as a store of interception, since the slower rates of infiltration may have been due to an already saturated soil as a result of a lack of heather protecting the soil below. After completing the spearman rank test, I found there to be a significantly weaker yet positive correlation between these two variables, with a result of 0.65. I again tested this against a critical values table and discovered that the possibility of this relationship occurring by chance was less than 5%, making the correlation between these two sets of data to be more significant than the data shown in figure 16 which therefore supports my theory that vegetation coverage must be the largest factor impacting the infiltration rates recorded in figure 6 and 8. I believe that this correlation was only a less than 5% possibility of chance and not a lower percentage due to the impact of heather burning leading to variation to the vegetation coverage, with some parts of the soil protected by heather, increasing infiltration rates, while other parts of the soil where more exposed to antecedent rainfall which now further explains the anomalies found in figure 23. This could therefore prove the impact of heather burning on the soil moisture within the North Yorkshire Moors, with increased soil moisture within areas that had been affected by heather burning and less soil moisture within areas still shielded by heather.

Area 3 Summary

Area 3. Methods of critical analysis. Students performed well when they had:	Area 3. Methods of critical analysis. Students performed less well when they had:
• demonstrated flair and innovation in combining photos with maps or graphs with maps so that data could be geo-located. • Included accurate and complete techniques with correct map and graph conventions. • made appropriate use of statistical techniques with test of significance. • included annotated photographs with analytical observations • looked for explanations for anomalous results • explained patterns and trends, showing understanding of the 'bigger picture' • comment on the degree to which the data collected was representative • commented on the accuracy of data sample • regularly linked analysis and interpretation directly to aim and hypotheses. • realised that the lack of a relationship between data sets or unexpected result is no less valid than one that shows a strong link. • shown awareness of the implications of the findings, returning to the theoretical aspects that drove the study.	• made indiscriminate over-use of computer-generated graphs • relied entirely on 'safe' and straightforward data presentation techniques • lacked a spatial element when displaying and analysing results • missed the standard conventions when drawing graphs and maps • missed opportunities to analyse results statistically • included misconceptions, e.g. Chi squared tests for correlation • insufficient data for a statistical test • missed significance testing as a final step. • missed opportunities for coding – instead producing tables of transcript answers from interviews conducted. • considered presentation, analysis and interpretation separately. • written a purely descriptive analysis without explanations of results, patterns and trends • missed opportunities to do data manipulation or make connections between data sets • failed to show understanding of "bigger picture" • seen anomalous results as inconvenient • made no link made to theoretical aspects or literature review •

Area 4 Conclusions, evaluation and presentation

Virtually all bar the weakest reports (who often hadn't completed the NEA) had a structure that flowed and was easy to follow. This structure usually took the format of the four areas of the mark scheme. Many studies were well organised, with titles, contents, pagination, well written paragraphs, techniques integrated into the study, full enquiry sequence, bibliography and appendix. Some even included an abstract or executive summary. Students should be commended for the quality of their written communication. The use of extended prose and technical language was often high level and mature. A range of appropriate presentation techniques were present in most, including location maps and photographs. Some of the weaker scripts were harshly marked here despite having a clear structure. Many students included a risk assessment which is not required in the written report. As reported in previous series, many students made too much use of an appendix, perhaps because they saw this as a way of increasing the word count without exceeding the 4000 word guidance available for the main text. The written text must function independently of its appendix.

There is some evidence that evaluations were weaker this year. They sometimes were brief, generalised, and superficial. The weaker scripts focused on practicalities of methodology and improvements, rather than producing a more holistic evaluation of the entire investigation. The ethical dimension generally was understood and explained. Whilst there is scope for commenting on the positives and successes of the study, there should be recognition that whatever method is used, it is flawed in some way. Better responses linked to the results and conclusions and showed an awareness of the extent to which the hypotheses/questions/aims had been fulfilled. Subsequent improvements and extensions can then be noted. Consideration of the conclusions in the wider context as well as opportunities to develop the work further were lacking in many of the scripts sampled.

Most attempted conclusions based around their original sub questions / hypotheses. In the better reports, students were able to summarise their findings, rather than simply repeat their analysis, giving a clear overview and returned to their underpinning theory and literature review to discuss and evaluate the extent to which their hypotheses have been realised. Better reports also recognised the tenuous nature of the conclusions and avoided a dogmatic approach, especially where the evidence was partial or limited. Some students indicated what they believe to have discovered but did not relate to any evidence, which is essential. Some lost sight of their initial purpose altogether. Overall conclusions were often brief in comparison to the sub questions and at times missing, so students were unable to draw the various strands of enquiry together at the end.

The ethical dimension deals with issues in collecting the data which may impact on people and/or environment. These examples illustrate issues in contrasting environments.

Ethical issues:

As stated previously, there were some ethical issues within this investigation, the largest one being inconvenience to the general public, particularly in Dalby Forest as this was a national park and people do visit this location which was why it was important for me to be considerate of the people around me, especially in terms of where my field equipment was placed, such as the rain gauges and evaporation pans as to avoid restricting peoples access to certain areas and to avoid the equipment from being damaged or the results from being tainted. Equally, I made sure to limit my impact to the environments in which I studied by picking up after myself and ensuring that the equipment I had left over night or several days had been collected once more after retrieving my data. Equally, while collecting soil samples, I ensured that I did not take a large mass and reduced the risk of future injury by filling the holes up with excess soil and leaves, ensuring that there was minimal impact to the environment and less risks to anyone potentially walking within the sites I had studied. Equally, while measuring the discharge level of Pickering Beck, the areas of farmland surrounding the river had also contained a large proportion of sheep on the field. To reduce interference and limit any stress on the animals, I ensured that I was a good distance away as to not affect them or cause stress in any way, especially with the loud noises caused by the use of the mallet when inserting the infiltration tube into the soil.

Ethics

All data of respondents across both my ranking scale and questionnaire was kept confidential and anonymous, staying within the parameters of the data protection act. By doing this it also improved response rates and accuracy as respondents knew they wouldn't be identified in their results, thus making them more willing to answer my questionnaire honestly. The pursuit of truth were considered at each stage of the questionnaire to help maintain integrity and honesty, overall avoiding bias and deceptive results. One of the main ethical issues relating to my data collection was having to walk around Lincoln in the middle of the day sporadically taking 360 degree photos, this may have aroused suspicions as to what I was doing amongst pedestrians. However this was resolved by the fact that I refrained myself from staying in one area for too long, instead I spent a maximum of 2 minutes in a given location and then moved on to the next. When taking the photos I also avoided using images that showed peoples faces, respecting people's privacy as I hadn't provided any consent before hand.

This (partial) evaluation considers several issues relating to the validity and reliability of methods adopted. The student subsequently considers the wider implications of the study and how further research might be undertaken.

Evaluation

I am confident with the reliability of my land use survey, as I went around Nettleham and assessed the building's age based on set criteria, and certain distinguishable features of buildings from different time periods. It should easily be repeatable. However, it is not necessarily valid, because a lot of the age identification, especially buildings that were built near the end of a period, was subject to my interpretation and opinion, if someone else were to conduct this exact same study they may find, slightly different results. Although, there is only a small margin of difference as there are set categories that would be hard to deviate from massively, it would be virtually impossible to identify a 1960s bungalow as a pre 18th century house.

The process behind handing out my questionnaire is very reliable, the dual method of stratified and random sampling ensures a fair and even distribution of questionnaires throughout a location, as long as each zone is roughly equal in number of households then each should have an equal chance of being picked. However, the validity of the results depends heavily on the sample size, I chose 50 houses out of roughly 1000 in Nettleham, about 5%. Because of this it is hard to make sweeping assumptions about the results, if I had sampled 300 houses the results certainly would have been more valid. However, this was not feasible for this study, the study is designed as an A-Level investigation.

The study to see if other people come to use Nettleham's services is reliable. The method is easy to repeat. However, to improve my investigation it would have been good to have conducted the same process at another couple of services, such as the fish and chip shop or the medical practice, this would have given more validity to the method as it would give a more accurate picture to how popular the services are with non-residents. The results may have not also been the most accurate as while I was asking some people, other may have been entering the Co-op, so I was unable to ask them. But this would have been quite an unachievable aim without the assistance of others.

The following conclusion to an investigation about carbon sequestration in seagrass within Torbay was written on a hypothesis by hypothesis basis. This ensured that the mini conclusions related back to the original aims and hypothesis, as well as providing an overall summative conclusion.

Conclusion

From my investigation I found that seagrass is an incredibly valuable resource in Torbay being worth over 1 million pounds. I saw the relationship between shelter and seagrass density and how protection from wave energy plays a vital role in the success of the Z. Marina meadow population. Depth also proved to play a big role in whether a seagrass meadow thrived and was able to store carbon. sunlight is not able to reach the ocean floor at greater depths. Finally, the effect of storms and the potential positive feedback loop that could be created by tropical areas losing seagrass and releasing carbon heating the atmosphere and causing further tropical storms.

1. **Shelter from wave energy increases the density of a seagrass meadow and therefore carbon storage.**

My first sub-hypotheses proved to be true with my sheltered area having double the seagrass shoot density as my exposed meaning that the sheltered area stored double the amount of carbon compared with the exposed area. I was aware of factors that could skew my data such has water quality so carried out my investigation in areas close to one another. From my findings it shows the importance of shelter when choosing areas of seagrass to conserve and protect as sheltered areas will be more likely to grow and become healthy ecosystems

2. **An increase in the depth of water will lead to a decrease in carbon sequestration.**

The depth of water also proved to be a factor affecting the density of a seagrass meadow. At 2.5 metres deep there was less than half the amount of seagrass then found at 0.5 metres and there was a decrease in seagrass density has the depth increased.

Looking out to season the right side of the beach the presence of seaweed may have decreased the population of seagrass at 0.5 metre depth. This was an important observation as it showed the importance of looking at all the factors when working with dynamic coastal environments such as a seagrass meadow.

All in all, I can say my hypotheses is true and it shows the importance of deciding what depths should be focused on when planting or restoring seagrass meadows and the importance of reviewing all factors such as the presence of seaweed.

3. **Storms have a significant impact on seagrass populations and therefore carbon sequestration.**

Through my use of qualitative data collection, I found a substantial amount of seagrass that had been eroded from the ocean floor and washed onto the beach.

I saw how this process would be made worse in tropical areas as both the magnitude of the storms would increase as well as the amount of seagrass.

I also found that in general the erosion of seagrass will cause carbon to be released contributing to global warming in turn increasing the frequency and amplitude of tropical storms in turn releasing more carbon from the destruction of seagrass in turn creating a destructive positive feedback loop.

4. **Seagrass is highly valuable as a carbon sink within Torbay.**

Using methods from similar studies I was able to calculate an estimate of the total amount of seagrass in the meadows at Torre abbey sands. I calculated there to be 18772 tonnes of seagrassthe 104.11 hectares of meadow in this area. My estimate of the seagrass population is worth 1.3 million pounds so is definitely a valuable carbon sink proving my 4th sub hypotheses to be true.

Area 4 Summary

Area 4. Conclusions, evaluations and presentation. Students performed well when they had:	Area 4. Conclusions, evaluations and presentation. Students performed less well when they had:
• produced a well organised, logically sequenced report, with pagination, appendix and bibliography. • a wide range of presentation techniques embedded in the report. • a cogently written report, grammatically correct and accurate. • evaluated the limitations of methodology with suggested improvements, reflected on strengths and weaknesses of the study and considered further research possibilities or other avenues of enquiry. • considered ethical issues concerning the collection of accurate and fair data. • reached valid conclusions based on the evidence collected, linked to initial aims. • explained unexpected or unusual outcomes. • referred to geographical theory or concepts in explaining the findings of the enquiry. provided a synthesis of the outcomes , effectively combining the evidence to reach a summative conclusion	• missed out part of the enquiry sequence eg the evaluation of the investigation • only included a narrow range of presentation techniques • made too much use of an appendix • limited the evaluation to purely logistical issues affecting methodology • asserted that all aspects of investigation were perfect • confused ethical considerations with risk assessment. • given vague or lengthy conclusions, repeating earlier analysis. • failed to provide an overall summative conclusion. • given plausible sounding conclusions that didn't draw on the evidence collected. • made exaggerated conclusions based on limited findings •

Support and guidance

Our reports on the exams are part of a suite of support we offer to enhance your understanding of our assessments and your students' performance.

Mark ranges and award of grades

Grade boundaries and cumulative percentage grades are available on the results statistics page of our website.

Enhanced Results Analysis (ERA)

Use our exam results analysis tool to create and customise different reports to help understand your students' performance.
ERA is our free online service for you to gain a detailed insight into your students' results. You can:

- analyse your students' scores for each exam question
- identify topics, skills and types of question where students may need further support
- compare your students' performance with those of other classes and with students in other AQA schools nationally.

For more information on ERA, log in through Centre Services.

Professional development

Attend one of our feedback courses where you can review example responses from students and commentaries from our examiners.

Contact us

Our friendly team will be happy to support you between 8am and 5pm, Monday to Friday.

Tel: 0800 197 7162
Email: geography@aqa.org.uk