AQA
Realising potential

A-LEVEL

A-LEVEL GEOGRAPHY
(7037)

EXAMPLE NEA INVESTIGATION

Marked investigation with commentary

An example investigation folder with completed proposal form and examiner commentary

A study of the physical and human causes of flooding on the River Wansbeck

Version 1.0 January 2018

Contents

2018 candidate record form

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

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

Centre number

Click here to enter.

Centre name

Click here to enter text.

Candidate number

Click here to enter.

Candidate's full name

Click here to enter text.

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

Candidate declaration

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

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

Click here to enter text.

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

Click here to enter text.

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

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

Candidate signature.

Date Click here to enter a date.

Teacher declaration

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

Teacher signature.

Date Click here to enter a date.

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

NEA proposal

To be completed by the candidate

Investigation title: A study of the physical and human causes of the flooding on the River Wansbeck

How the title links to the specification content

The investigation links to section 3…….”Water and Carbon Cycles” and will primarily be a study of the physical characteristics of the catchment area to include topography, infiltration rates, soil characteristics and geology. Human influence on flooding in the catchment area will also be considered by investigating land use and water management.

Planned investigation hypothesis or question/sub-questions

Are the causes of flooding on the River Wansbeck primarily physical or human? To what extent is topography the primary factor in the cause of flooding on the River Wansbeck? Is there a correlation between infiltration rates and land use in the Wansbeck catchment area? How could changes in land use in the Wansbeck catchment area reduce the risk of flooding?

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 River Wansbeck is located in South East Northumberland and runs through the major settlements of Morpeth and Ashington. The river has a history of flooding and the Environment Agency has identified Morpeth as being at “high risk” of flooding in the future. After significant flooding in 2008 the Environment Agency has completed a £25 million flood management project to reduce the risk to homes and properties in the town. I want to investigate the physical reasons the Wansbeck is so susceptible to flooding so that I gain a greater understanding of the processes which operate in the catchment area directly upstream of my home town, Morpeth. By completing an infiltration study and a land use survey I hope to demonstrate that flood risk could be reduced further by planting more woodland in the catchment area. I believe this land use may also improve the recreation and conservation value of the catchment area.

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

Quantitative Methods: Land use survey: The watershed of the catchment area will be determined by studying Ordnance Survey Maps. The land use of each square Km in the catchment will be determined from satellite imagery and Ordnance Survey maps. The predominant land use in each square km will be given a code e.g. Arable land (AL), Pasture (P), Moorland (M), Deciduous woodland (DW), Coniferous woodland (CW), Urban, (U). 2) An infiltration study will take place at sites within the catchment area so that the rate of infiltration for each land use can be determined. 3 sites for each land use will be tested to ensure an average rate can be determined. The sites will be selected from upper middle and lower reaches of the catchment. The infiltration study will not take place following heavy rain to ensure the soil is not saturated. 3) Soil Survey, samples will be taken at each of the 18 sites and % Clay and % Sand will be determined by using a soil texture chart 4) Soil depth will be determined by using a soil auger 5) Topographic Survey: To determine the influence of topography 3 cross profiles will be drawn. Each profile will extend 5km either side of the channel and slope angle will be measured every Km using a sighting clinometer and 2 ranging poles placed 10m apart.

Data collection: ☐ Individual ☐ Group

To be completed by the teacher

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

There are clear links to the specification, there is a clear focus for the investigation and there is a clear locational context. Most importantly there is a clear geographical issue to investigate, so the proposal is approved, however there needs to be some fine tuning on the following issues:1) The scale of the enquiry. If you are planning to collect all of the primary data in one day then you will have an awful lot of sites to visit. Consider which parts of the enquiry are most important and what you can manage in the time you have available. Think about transport as well. 2) Risk assessment. If you are going to be out on the moors on your own, do you know how to read a map, does somebody know where you are going to be, and how will you get help if you get lost or into trouble? I've got concerns about your safety. I need to see a full risk assessment before this is approved.3) Access arrangements. Remember you only have a right to roam in some parts of the catchment. It might be worth contacting farmers or landowners before getting out in the field to ask permission. Otherwise you will need to remain on Public Rights of Way. 4) Methods. Don't do too many, considering the size of the area and the time you have to collect the data. Is your study over-ambitious, covering too wide a range of themes?

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

Full name Click here to enter text.

Teacher signature.

Date Click here to enter a date.

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

Area	Level	Overall level	Mark	Comment
Area 1. Introduction and preliminary research **10 marks** (a) To define the research questions which underpin field investigations (AO3)	2	2	4	a) Research questions are referred to intermittently and not referred to throughout the project. b) Literature sources are appropriate but often referenced poorly and text is “lifted” without evidence of interpretation or application to the study area.
(b) To research relevant literature sources and understand and write up the theoretical or comparative context for a research question (AO3)	2			
Area 2. Methods of field investigation **15 marks** (a) To observe and record phenomena in the field and devise and justify practical approaches taken in the field including frequency/timing of observation, sampling, and data collection approaches (AO3)	2	2	7	a) Methods selected are appropriate to the enquiry and allowed collection of satisfactory primary data. The justification is intermittent and the discussion of sampling strategy is weak. Details on frequency/timing are inconsistent. b) Descriptions of some primary methods show clear understanding. c) The quality of data recorded was fit for purpose, although not all methods were followed up. More could have been done to test slope angle more effectively.
(b) To demonstrate practical knowledge and understanding of field methodologies appropriate to the investigation of human and physical processes (AO3)	3			
(c) To implement chosen methodologies to collect data/information of good quality and relevant to the topic under investigation (AO3)	2			

Area	Level	Overall level	Mark	Comment
Area 3. Methods of critical analysis **20 marks** (a) To demonstrate knowledge and understanding of the techniques appropriate for analysing field data and information and for representing results, and show ability to select suitable quantitative or qualitative approaches and to apply them (AO3)	2	2	7	a) Basic data manipulation- presenting line graphs, working out mean and range, simple calculations eg %, presentation of simple graphs. The methods of analysis are satisfactory but not particularly robust or effective. No statistical analysis, weak application of secondary data analysis to the subject. b) Good breakdown of weaknesses and anomalies, shows depth of geographical thinking to establish and explain patterns however few links between data sets discussed. c) Background knowledge evident but application to explain phenomena inconsistently expressed.
(b) To demonstrate the ability to interrogate and critically examine field data in order to comment on its accuracy and/or the extent to which it is representative, and use the experience to extend geographical understanding (AO3)	2			
(c) To apply existing knowledge, theory and concepts to order and understand field observations (AO2)	2			
Area 4. Conclusions, evaluation and presentation **15 marks** (a) To show the ability to write up field results clearly and logically, using a range of presentation methods. (AO3)	2	2	6	a) Clear and logical however some basic errors eg map of study area, no table of figures, contents page or appendices. Graphs well drawn, generally fluent and clear throughout. b) Wider context discussed however lacking depth of application. Ethical dimensions not discussed. c) Inconsistent and poorly referenced use of secondary evidence, weak analysis overall but with a broad base of primary evidence to answer the geographical question. Final conclusions present a partially argued case.
(b) To evaluate and reflect on fieldwork investigations, explain how the results relate to the wider context and show an understanding of the ethical dimensions of field research. (AO3)	2			
(c) To demonstrate the ability to write a coherent analysis of fieldwork findings in order to answer a specific geographical question and to do this drawing effectively on evidence and theory to make a well-argued case. (AO3)	2			
	Total (60 marks)		24	

Details of additional assistance given

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

Click here to enter text.

Concluding comments

Click here to enter text.

The introduction has a broad title and there is no clear question.

There is clearly a geographical context which is linked to the specification although it is not stated explicitly.

The map of the study area is not appropriate as this is a study of the wider catchment area, not just one small part.

Evidence of secondary research but not adequately referenced.

More detail needed on Environment Agency categorisation.

Some mention of sub-questions here

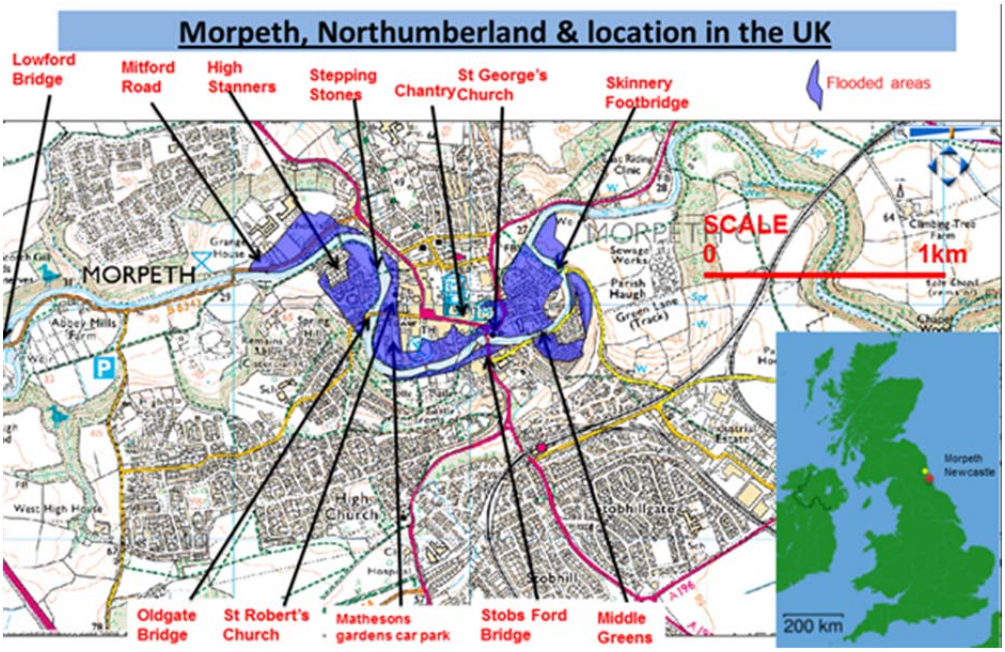
A-level textbook not adequately referenced.

Relevant, evidence of understanding the broad concepts outlined in the specification.

A study of the physical and human causes of the flooding on the River Wansbeck

Introduction

The River Wansbeck is a small river in South East Northumberland in North East England which flows for a distance of approx. 60km from source to mouth. Its source is in an area of moorland in the North Pennines which lies next to Northumberland National Park and its mouth is on the East coast of the county where it reaches the North Sea. Major settlements on the River include Morpeth and Ashington.



Morpeth is built on the floodplain of the Wansbeck and is vulnerable to flooding. There was a significant flood in 2008, and flooding has also occurred in….. 1863, 1876, 1877, 1878, 1881, 1886, 1898, 1900, 1903, 1924, 1963 and 1968 according to Wikipedia. The Environment Agency has classified Morpeth as being at high risk of flooding and following the floods of 2008 a flood protection scheme has been built at a cost of £25million. Despite the flood protection scheme the Environment Agency predicts Morpeth will flood again.

This investigation will look at the possible causes of the flooding of the River Wansbeck and discuss the relative importance of both Human and Physical causes. In particular it will examine the role of land use within the catchment area and whether there is a link between current land use and the high risk of flooding. The first sub-question in this enquiry is

"Are the causes of flooding in the River Wansbeck primarily physical or human?"

A-level textbooks say drainage basins act as systems whereby interrelated parts work together. There is a series of components and connections within the system which are in a state of dynamic equilibrium at most times of the year. A storm represents a period of time when the input of precipitation is too great for the system to remain in equilibrium so that a flood may occur in another part of the system. Factors which are important in this system are shown in the diagram below.

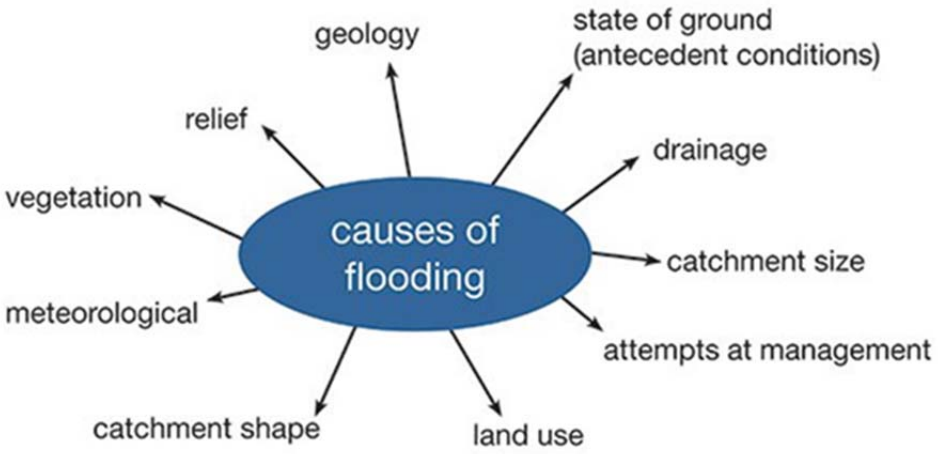


Fig 2. Factors affecting flooding. Reference: geography-fieldwork.org/a-level/water-carbon/flooding/

This investigation will focus on the human factor of land use and the physical factors of relief, soil type and geology. By using Ordnance Survey maps and a clinometer the investigation will show the height and relief characteristics of the drainage basin and make a judgement on whether topography is the most significant factor causing flooding. The investigation will use a land use study and an infiltration study to show if the catchment's infiltration rates for different land uses. By combining the results of primary data with secondary data relating to soil and rock type I hope to show that land use is the most important factor in reducing the risk of flooding in the area.

Adequate referencing.

A bit jumbled. Mention of methods and conclusions but not particularly clear. There is understanding there but it is not expressed clearly.

The description of the method is clear however the first column should also describe the method using OS maps

Mention of sampling strategy, but does the student understand the strategy? No explanation given.

Justifications and limitations good.

Methodology

Method	Description	Sampling Strategy	Justification	Strengths	Limitations
Topographic survey	The Wansbeck drainage basin covers an area of 180Km2 and the length of the River Wansbeck is approximately 35Km from source to the town of Morpeth. I decided to create 3 transects and measure slope angle along these transects. As each transect was approximately 10-15km in length I decided to sample slope angle at 1km intervals. I made a simple clinometer out of a 1m 50cm length of wood attached to 2 shorter lengths of wood (75cm). The shorter lengths were placed vertically on the slope and the angle of the longer length was measured with a clinometer.	I adopted a stratified sampling strategy as it would have been impossible to measure every slope angle in the drainage basin. 1km intervals on the transects were selected in order to make the number of sites manageable.	Drainage basins with steep slopes are more likely to flood than those with gentle slopes and if the study showed the area had steep slopes this could indicate topography is the main cause of flooding in the catchment.	The clinometer was lightweight and easy to carry but due to the number of sites I decided to stop using the clinometer and to create drainage basin cross profiles using contour lines shown on the 1;25000 Ordnance Survey map and graph paper.	I used the clinometer to record slope angle at the first 7 sites only. I underestimated the time taken to access all of the sites on each transect and I was unable to visit all of the sites. The equipment I used was not able to show changes in slope angle over 10s of Kilometres. Where slope angle was measured the gradient was 5 degrees or less, which didn't accurately reflect the topography elsewhere in the grid square.

Appropriate methods for the enquiry however the description could go on to say how the data could be used.

Again, no clear understanding of the sampling strategy shown.

Confusion of subquestion and hypothesis. No hypothesis stated.

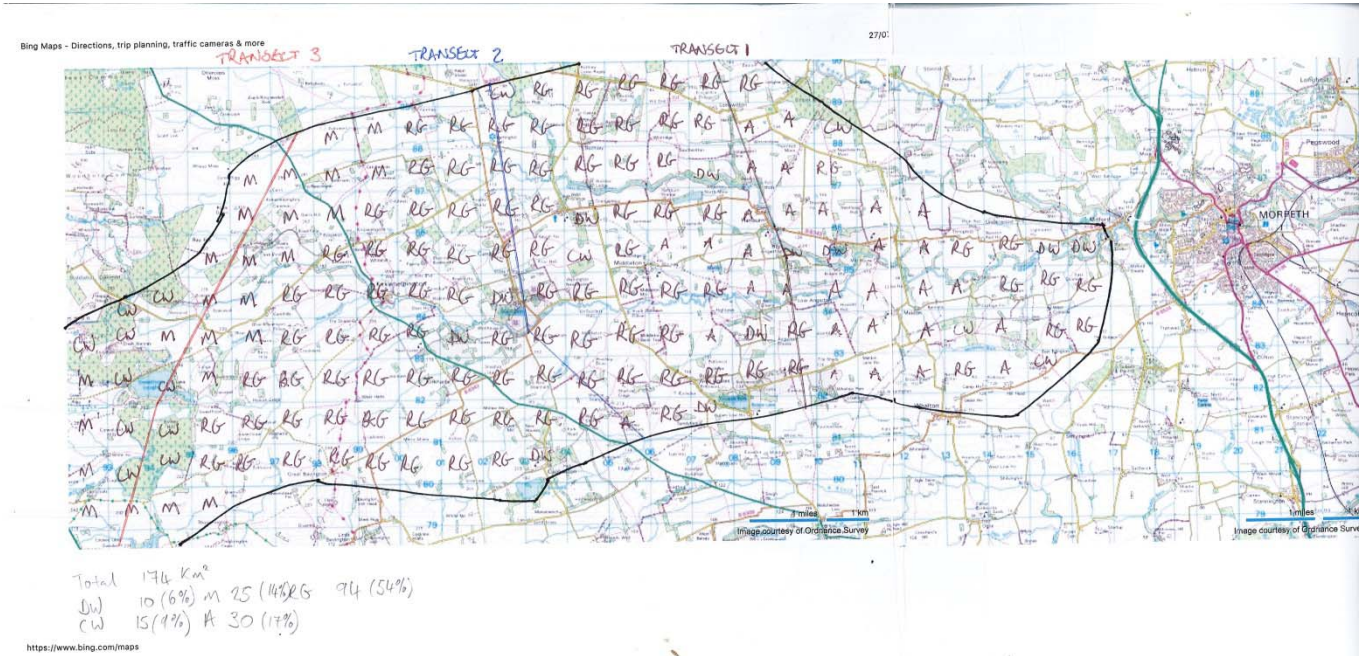
Weak justification.

Poor explanation of bias. Human error would have been a better term.

Method	Description	Sampling Strategy	Justification	Strengths	Limitations
Land use mapping	I used aerial and satellite photos (Shown on Google Earth) as well as Ordnance Survey Maps to work out where the watershed between the Wansbeck and its neighbouring catchments lay. I then classified the land use in each grid square using the map key and aerial/satellite photos. I classified the land use in the catchment into the following categories; Moorland Rough Grazing or pasture Coniferous woodland Deciduous woodland Arable farming	I used a stratified sampling strategy to make sure that every grid square was recorded. I recorded the information on a base map (shown in fig 3)	My hypothesis suggested land use might be an important factor in the causes of flooding in the area so I wanted to find out what the most common land use was.	This was a useful method for finding out about the overall land use in the area however there may have been some human error in recording land use so the results could be unreliable.	It is possible I might have been biased when choosing the land use in each square, for example I might have thought it was moorland on the photo but in actual fact it was rough grazing on the ground. It was difficult to tell the land use using Ordnance Survey maps.

Appropriate methodology, appropriate presentation, appropriate analysis, appropriate discussion of limitations elsewhere in the project.

Figure 3



Description should include field equipment. What is an infiltrometer? How does it work?

No explanation of access issues. Could have used this as evidence for ethical considerations but not developed enough.

Confusion of terms- coniferous/deciduous woodland were used in land use mapping but in this section it is woodland.

Appropriate strengths but limitations are based on results, not methods.

Method	Description	Sampling Strategy	Justification	Strengths	Limitations
Infiltration Study	At regular intervals I recorded the infiltration capacity of the soil using an infiltrometer. The infiltrometer recorded how much water was absorbed into the soil in a 10 minute period. I recorded the water level every 15 seconds at 12 sites altogether. The equipment I used was an infiltrometer, stopwatch and recording sheet.	I used a stratified sampling strategy to eliminate bias and human error. There were 5 land uses but I only recorded information on 4 land uses because of access issues.	My hypothesis suggested there may be a link between land use and infiltration. If the rates of infiltration were higher in woodland for example, that might suggest that woodland was the best land use. On the other hand if the method showed the highest rates of infiltration were in grazing this might not be proved.	This method produced a lot of quantitative data to help with the enquiry. I used the data to present line graphs so that the differences between different land uses can be easily seen. The equipment was easy to carry and there was not much possibility for human error.	The results from the infiltration study showed a wide range of infiltration rates in each land use. This suggests the infiltration study may not have been the most reliable method.

What is a soil texture flow chart? What does it look like? How do you use it?

Rubbing, rolling etc. Not detailed.

Sampling strategy is OK.
Justification is OK.
Strengths and limitations OK.

Method	Description	Sampling Strategy	Justification	Strengths	Limitations
Soil Survey	I used a soil texture flow chart to find out soil texture at different sites. By rubbing the soil, rolling it into a ball etc. I could work out if the soil was clay, sand, sandy loam etc. I recorded the information on a recording sheet	The soil texture was recorded at each of the different land use sites so that I could build up a picture of the land use in the whole catchment. I also used secondary data to back up the results which I found in the field.	The soil type may have played an important role in the risk of flooding so I wanted to find out what the overall soil type of the catchment area was. I did not have a soil auger so had to use the soil texture chart as this was a cheap and easy method.	There was very little chance of bias as the soil samples were taken at the same sites as the infiltration study. The method did not require any specialist equipment and the flow chart was easy to follow.	The soil survey only gave me a small amount of primary data so it was necessary to use secondary data to make an overall judgement on soil type in the catchment area.

Cross profiles/ transects are presented clearly however the judgement on slope angle is flawed. The whole catchment could have been sampled if overall slope angle was determined from each grid square. This would have led to a much larger sample and more reliable conclusions.

Presentation, interpretation and analysis

Physical causes of flooding

1: Topography

The first physical factor I investigated was the effect of topography in the catchment area. Fig 4. shows 3 transects across the middle and upper course of the River Wansbeck and also shows the mean slope across each square Km. 100% of the grid squares sampled had an overall slope angle of 0.5% which can also be described as level. The limited readings I took with the clinometer also showed slope values less than 0.5%. By using primary data which I recorded in the field and secondary data shown on Ordnance Survey maps I conclude that the slopes are generally level or almost level throughout the catchment so topography is not the likely cause of flooding.

Appropriate presentation

Very limited sample to make judgements on overall topography of the catchment.

How was the judgement of "Level" made?

Figure 4 topographic survey

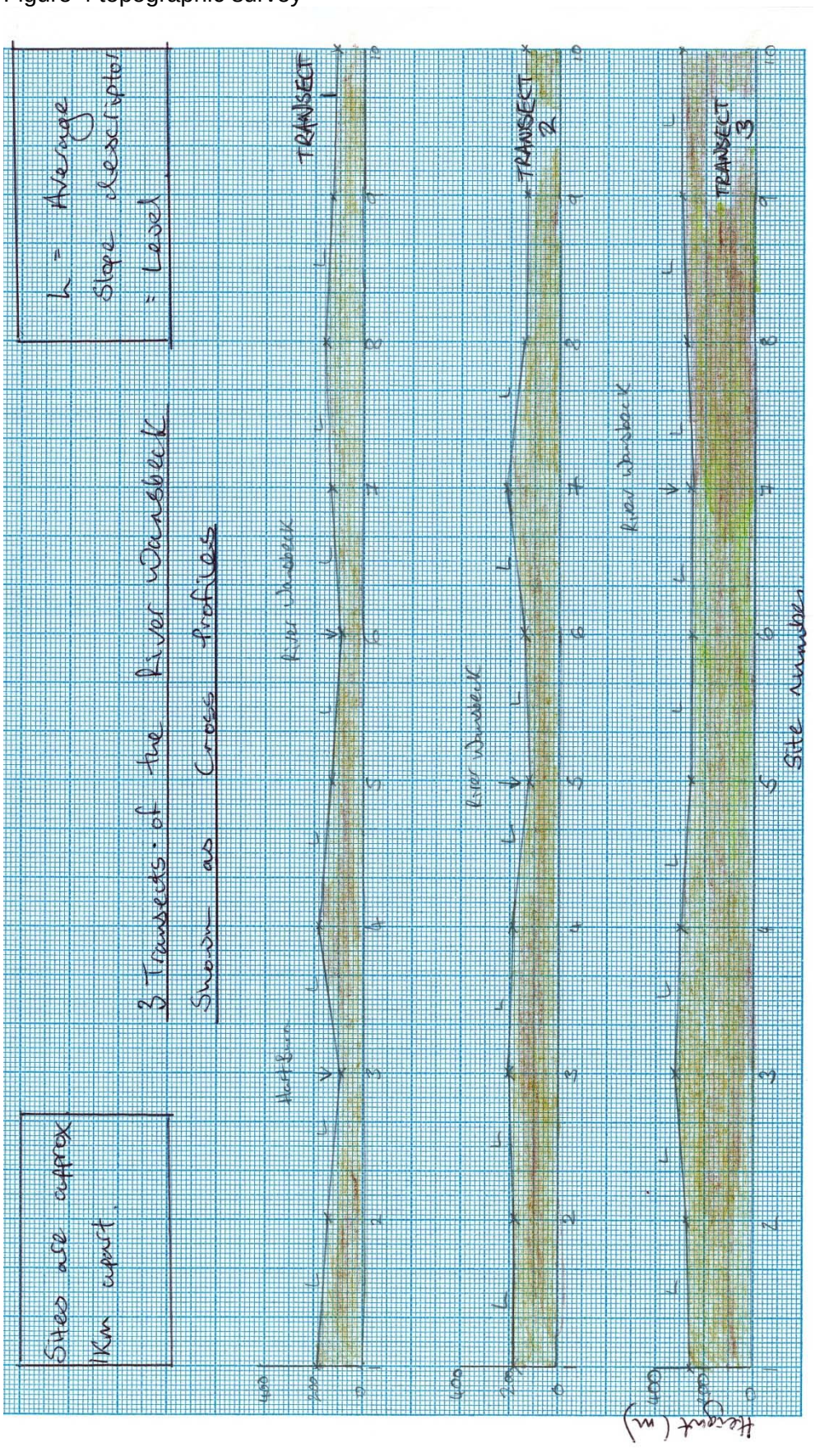


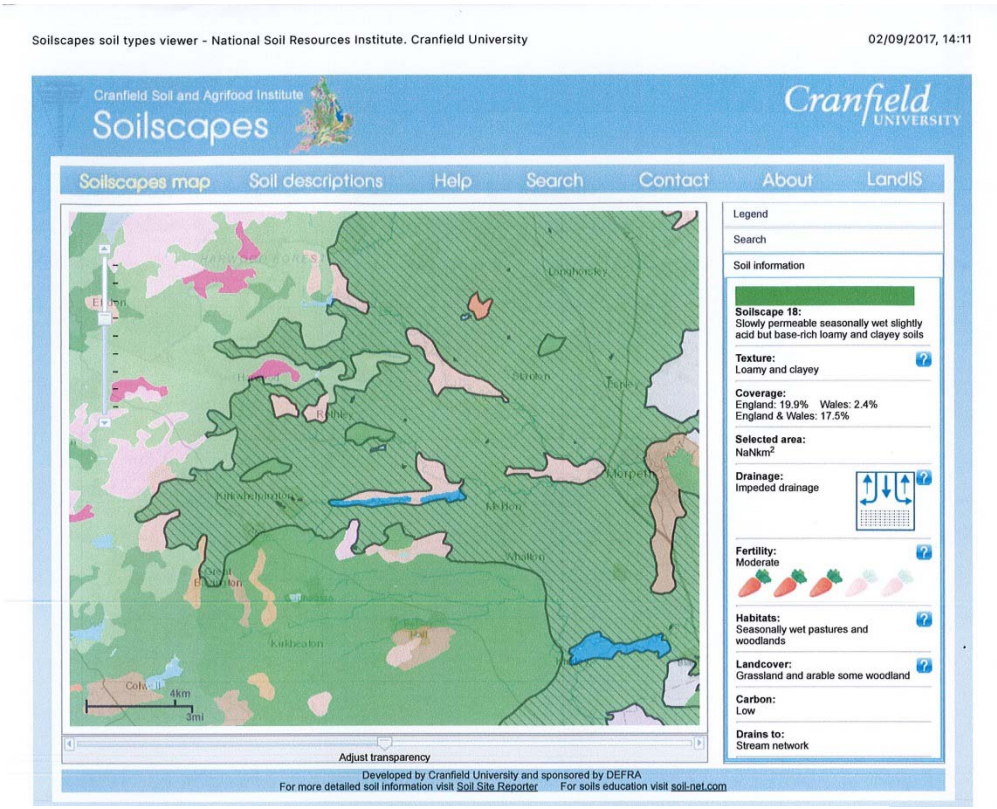
Figure 5 is not presented. LIS data is good source of secondary data but where is the interpretation? Just copying terms doesn't show depth of understanding.

2: Soil type

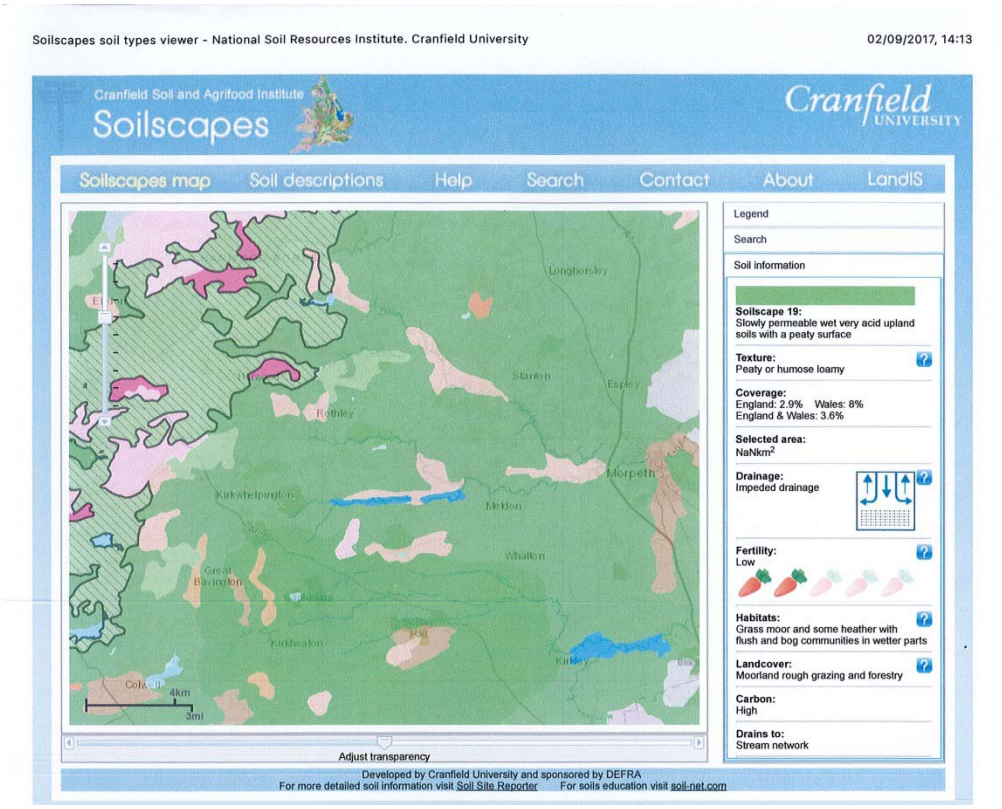
Fig 5. shows 6 of the 12 sites I visited in the catchment had sandy clay soils, and 10 of the 12 sites were clay rich. Fig 6 is a map from the Land Information service which shows the majority of the soil in the catchment can be described as loamy and clayey with impeded drainage (soilscape 18). In the upper course of the catchment the LIS describes the majority of the soil as peaty or humose loamy with impeded drainage (soilscape 19). There are also areas of peat bog soils in the upper courses which have surface wetness. Primary and secondary data both show water is not easily absorbed into the soil in the catchment area. Because of this I conclude that during periods of heavy rain or in seasons where total rainfall is higher, there is likely to be a lot of surface runoff in the catchment. Soil type is therefore an important cause of flooding.

Figure 6

Appropriate secondary sources but interpretation/ application to the wider concepts is lacking.



http://www.landis.org.uk/soilscapes/


Soilscapes soil types viewer - National Soil Resources Institute. Cranfield University
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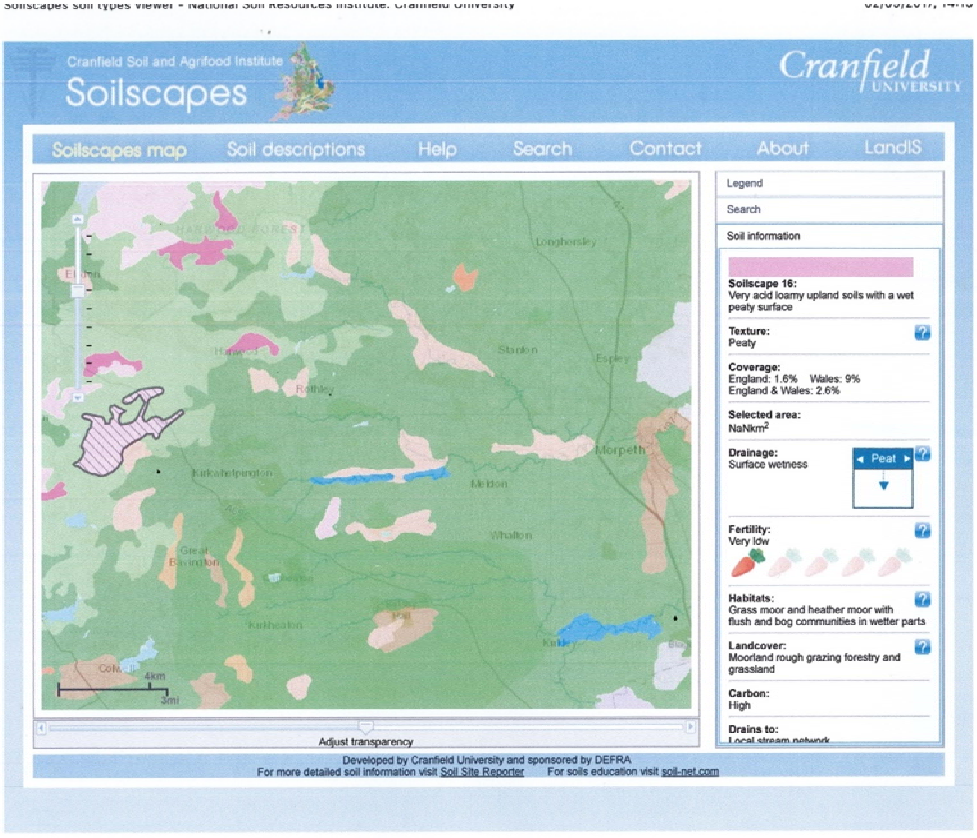
Cranfield Soil and Agrifood Institute
Soilscapes
Cranfield UNIVERSITY
Soilscapes map
Soil descriptions
Help
Search
Contact
About
LandIS
Legend
Search
Soil information
Soilscape 19:
Slowly permeable wet very acid upland soils with a peaty surface
Texture:
Peaty or humose loamy
Coverage:
England: 2.9% Wales: 8%
England & Wales: 3.6%
Selected area:
NaNkm2
Drainage:
Impeded drainage
Fertility:
Low
Habitats:
Grass moor and some heather with flush and bog communities in wetter parts
Landcover:
Moorland rough grazing and forestry
Carbon:
High
Drains to:
Stream network
Longhorsley
Stanton
Espley
Rothley
Morpeth
Kirkwhelpington
Meldon
Whalton
Great Bavington
Kirkheaton
4km
3mi
Adjust transparency
Developed by Cranfield University and sponsored by DEFRA
For more detailed soil information visit Soil Site Reporter
For soils education visit soil-net.com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Cranfield UNIVERSITY
Soilscapes map
Soil descriptions
Help
Search
Contact
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LandIS
Legend
Search
Soil information
Soilscape 16:
Very acid loamy upland soils with a wet peaty surface
Texture:
Peaty
Coverage:
England: 1.6% Wales: 9%
England & Wales: 2.6%
Selected area:
NaNkm2
Drainage:
Surface wetness
Peat
Fertility:
Very low
Habitats:
Grass moor and heather moor with flush and bog communities in wetter parts
Landcover:
Moorland rough grazing forestry and grassland
Carbon:
High
Drains to:
Longhorsley
Stanton
Espley
Morpeth
Meldon
Whalton
4km
3mi
Adjust transparency
Developed by Cranfield University and sponsored by DEFRA
For more detailed soil information visit Soil Site Reporter
For soils education visit soil-net.com

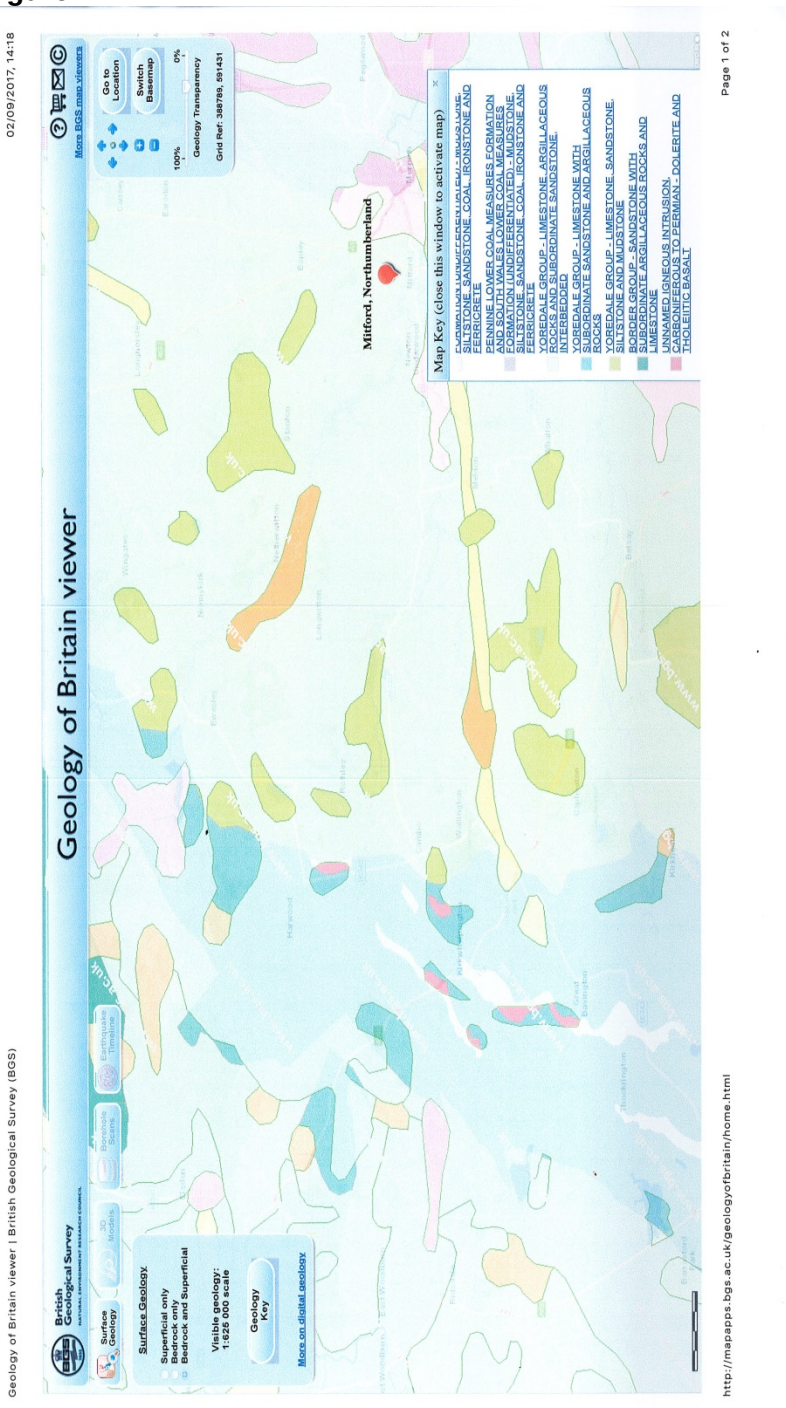
Why? No justification. Secondary evidence on permeability would have improved this, however conclusions are valid.

Appropriate presentation. Application of knowledge on permeability is there, but not detailed.

3: Rock Type

I did not record primary data on rock type but used the British Geological Survey Geology of Britain viewer to show rock type in the catchment. The lower part of the catchment is made up of limestone, sandstone, siltsone and mudstone and the upper course has limestone overlying sandstone and argillaceous rocks. A map showing the distribution of these rock types is shown in fig 7.Limestone, siltstone and mudstone have low permeability and for this reason soils are likely to remain wet throughout most of the year leading to soil saturation following periods of heavy rain which may then lead to overland flow and then flooding.

Figure 7



Human causes of flooding

Simple conclusion. Credit for acknowledging weaknesses.

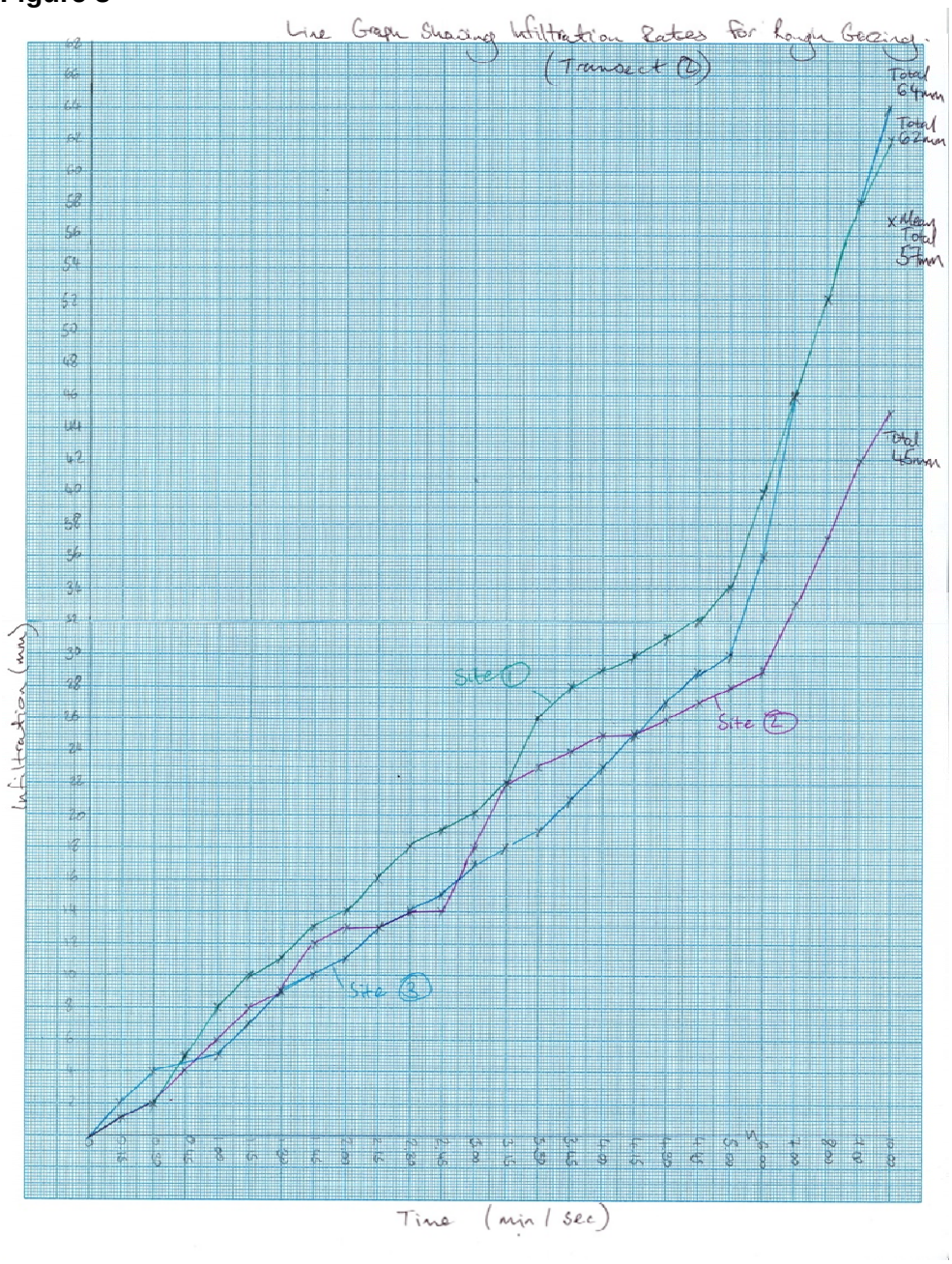
1: Land Use
Fig 3 shows that the total area of the catchment) is 174 square km. Of this 94 square km (54%) is currently used for rough grazing or pasture, 30 square km (30%) is used for arable farming, 25 square km (14%) is moorland, 15 square km (9%) is coniferous woodland, and 10 square km (6%) is deciduous woodland. The results of the infiltration study show that the lowest rates of infiltration are found in moorland and the highest rates of infiltration are found in deciduous woodland, leading to the conclusion that deciduous woodland is the most suitable land use for increasing soil infiltration rates. There are, however, weaknesses and conflicts within the primary data which will be discussed below.

Perfect opportunity for statistical analysis but doesn't go beyond simple statistical measures (mean/range)

Rough Grazing (figure 8)
The data for rough grazing is the most reliable as there is a small range in data between the 3 samples (range in totals=19mm). All 3 samples showed a steady rate of infiltration in the time period with no obvious anomalies. Another factor which confirms reliability is that the soil type recorded at each site is the same (sandy clay).

Well presented, accurately drawn, appropriate.

Figure 8



Again, missed opportunity to discuss ethical dimensions

Arable Farming
Due to access issues I did not record any data for arable farming meaning that any overall conclusions about the catchment's infiltration rates could be inaccurate. I have used secondary data to describe arable farming infiltration rates (shown in fig….) but as these were not recorded in the catchment area their values could be considered invalid.

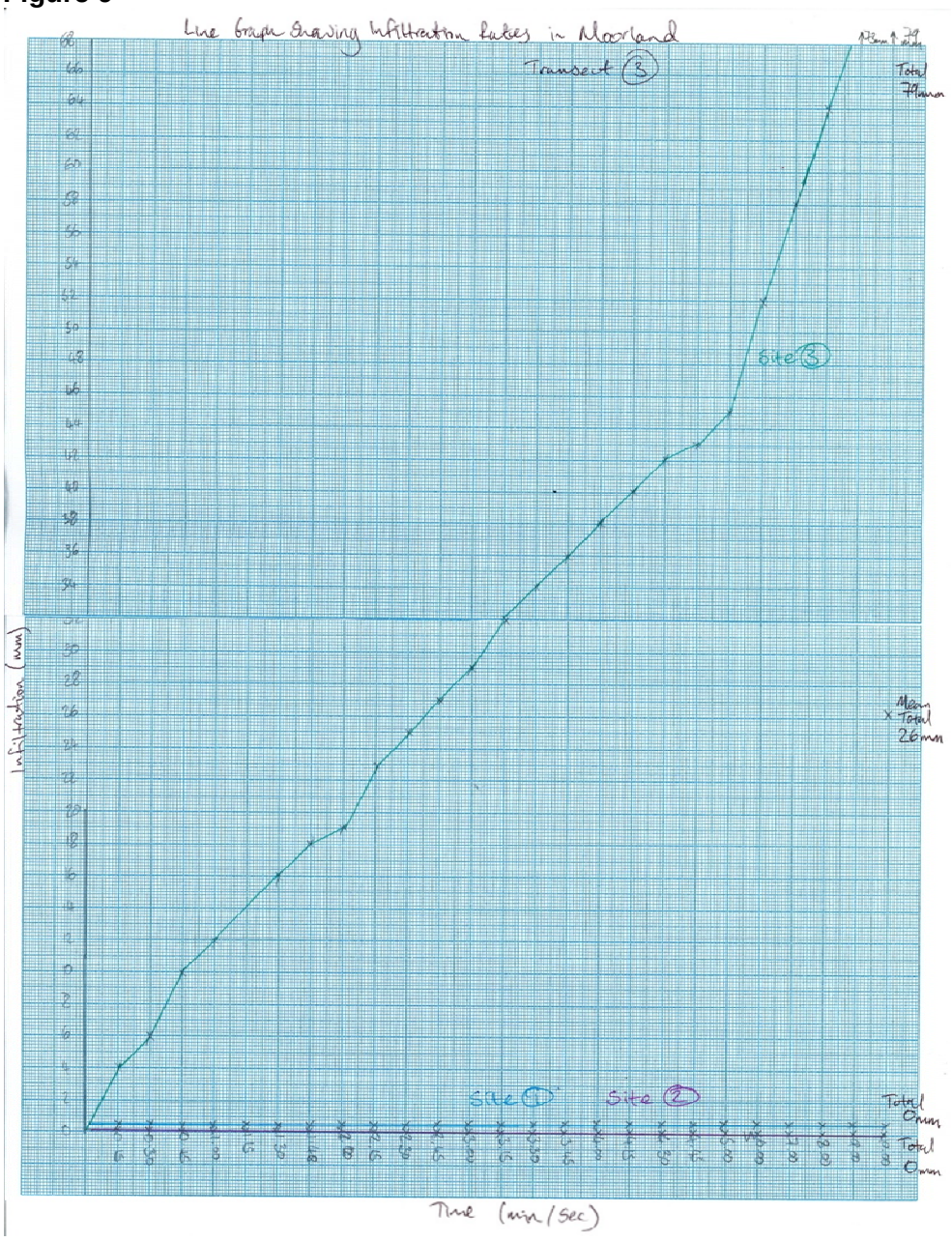
Moorland (figure 9)
The data for moorland suggests infiltration rates are the lowest in the catchment area however there were anomalies with the primary data recorded. In 2 of the 3 sites no infiltration occurred at all and in one site the total infiltration was significantly higher at 79mm. The mean total value was 26mm but the range in totals was 79mm. Reasons for the anomalous results at site 3 could be due to

Sensible explanations of anomalous results. Thinking like a Geographer.

Logical order

local topography. Site 3 was at the top of a hill and the other sites were on lower slopes or boggy areas. The drainage at site 3 was therefore better than at the other sites as water moves through the soil due to the effect of gravity. The range in values in moorland means the mean total should not be considered accurate.

Figure 9

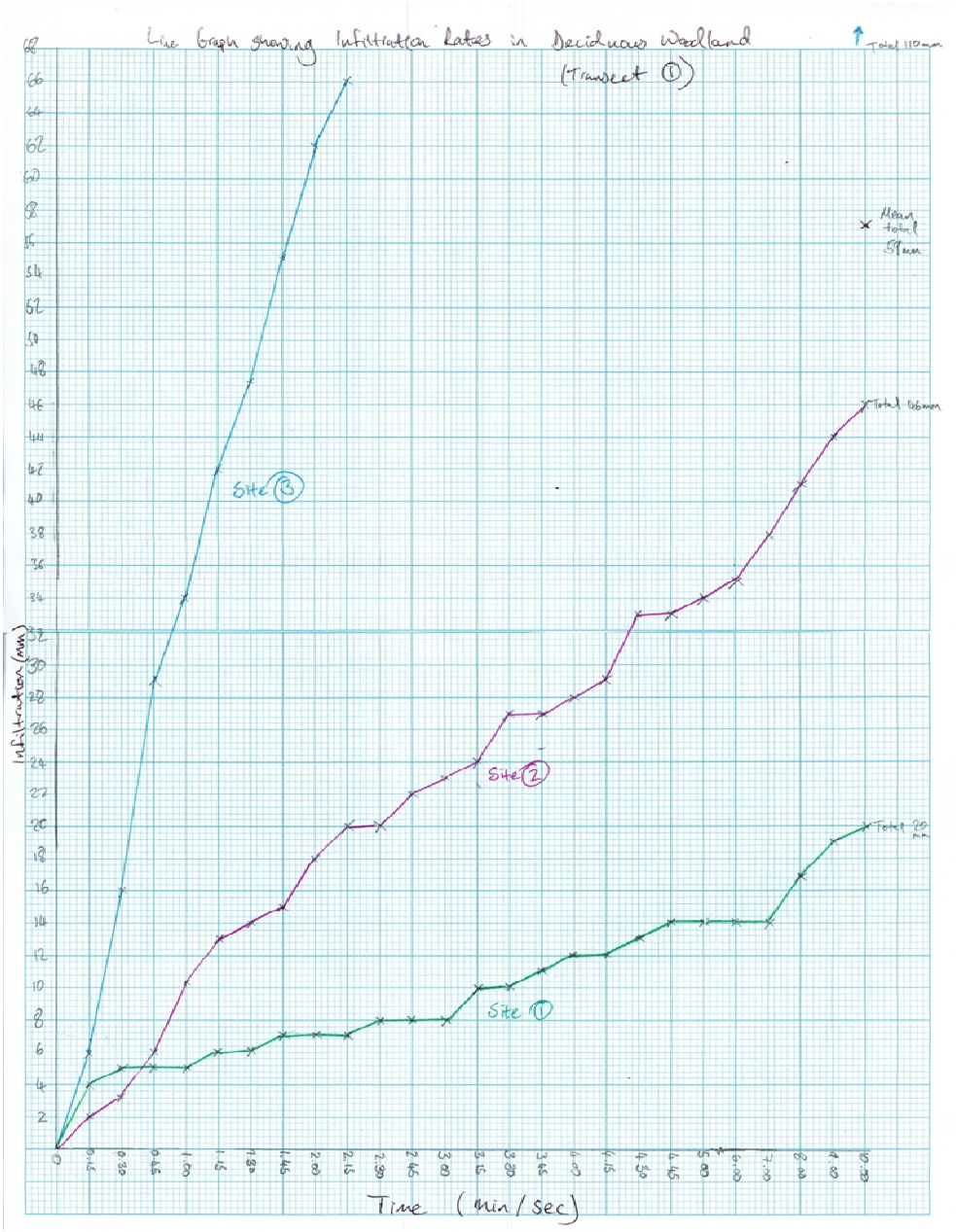


Deciduous Woodland (figure 10)

The data for deciduous woodland shows the highest rates of infiltration however there were anomalies with the data recorded. The mean infiltration was 59mm however the range between the 3 samples was the highest of all those tested at 90mm. Slope aspect may have been the reason for the anomaly as site 1 was at the bottom of a slope, site 2 was in the middle of a slope and site 3 was at the top of a slope. There were very high rates of infiltration at the top of slopes in both moorland and deciduous woodland, suggesting that these parts of slopes

have higher capacity for infiltration than those lower down.

Figure 10

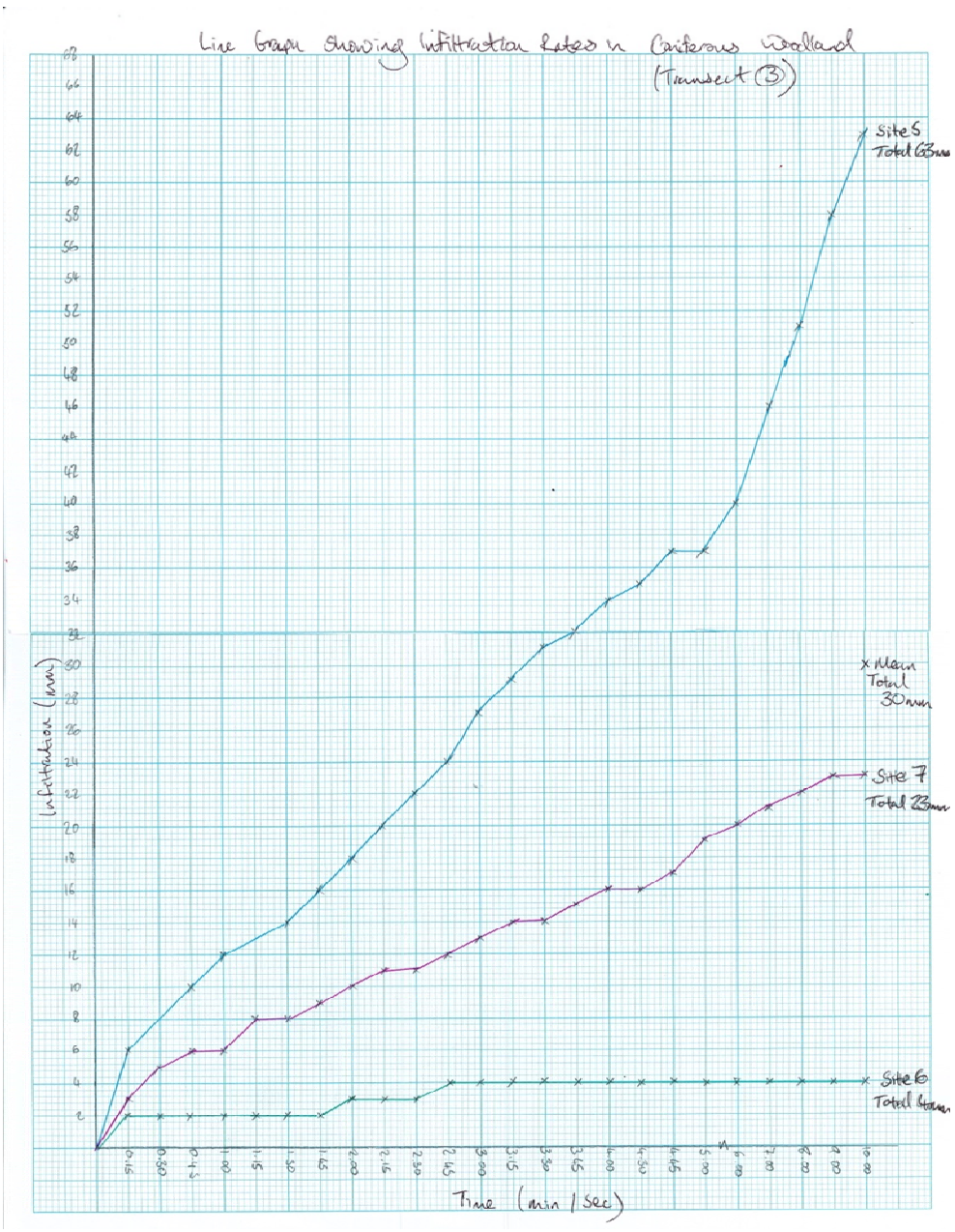


Appropriate discussion of anomalous results, appropriate discussion of use of secondary data.

Coniferous woodland (figure11)
The data for coniferous woodland shows a mean significantly lower than deciduous woodland with a mean total of 30mm. The range was the second highest of all of those tested with a difference between the highest and lowest totals of 59mm. The large range in totals suggests this data may not be reliable and a possible reason for this is the variety in soil type between the sites. Site 5 presented with loamy sand which coincided with the highest infiltration rate, site 7 presented with silty clay and the infiltration rate closest to the mean, whereas site 6 presented with clay soil and had an infiltration rate of only 4mm across the 10 minute recording period.

To reduce the impacts of anomalous results I decided to undertake secondary research to find data to compare my primary results to.

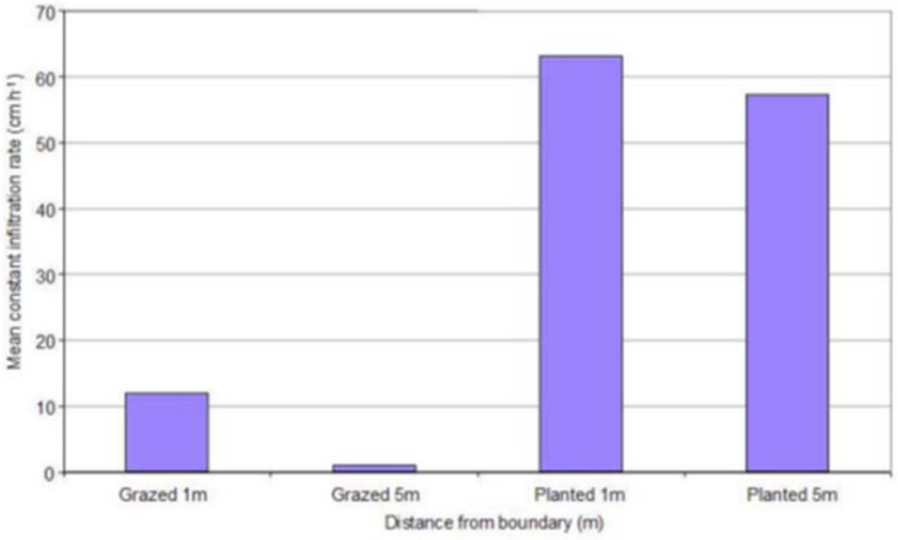
Figure 11



Appropriate data but not clearly referenced. Appropriate secondary data but the student has not done much with it. No interpretation. Application to the study is missing.

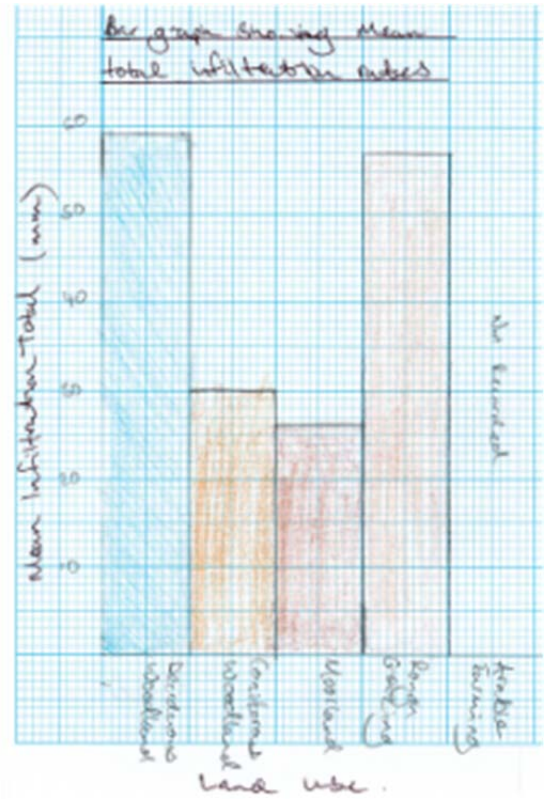
Forest Research presented a report titled *Woodland for Water: Woodland measures for meeting Water Framework Directive objectives,* which states trees can help alleviate flooding due to *"The higher infiltration rates of forest soils. Studies at Pont Bren (Bird et.al 2003) in Wales found that infiltration rates were up to 60 times higher within young native woodland shelterbelts compared to grazed pasture* (Fig 12.).
The report also showed that *"Recent modelling predicts that planting shelterbelts across the lower parts of grazed grassland sites could reduce peak flows by between 13 and 48% (Jackson et al 2008). These benefits could apply to woodland planting as a part of future sustainable drainage systems."*

Fig 12 Comparison of Infiltration rates in Woodland and Grazing (Bird et al 2003)



No interpretation

Fig 13 Primary data comparing infiltration rates in woodland, moorland and grazing



What is subquestion 3?

What is the conclusion here?

More needed on further study. Too basic.

All valid points, not a lot of development but understanding of geographical concepts shown.

Could be phrased better. As a result of my investigation I have discovered a new line of enquiry for future study….

Obviously? Why?

Again, relevant concepts discussed but clarity, depth and development of points is lacking.

No references, no table of figures, no appendices, no contents page or title page.

Conclusion and evaluation

My analysis has shown that the results of my infiltration study were unreliable. Land use mapping shows that the majority of the catchment is currently used for grazing and that only 14% is currently used for forestry. By using the results shown by Bird et al (2004) it can be shown that there is a clear link between land use and infiltration rates. In order to answer sub-question 3 accurately a further study of the Wansbeck could be employed using Bird et al's methodology.
Using Bird et. al's findings there is evidence for increasing the amount woodland in the catchment of the River Wansbeck and there are many reasons woodland could help reduce the risk of flooding. Trees can improve infiltration rates in soil, and trees can act as a store for water, therefore an increase in forestry could provide more time for issuing flood warnings. Increased forestry could also help to reduce the effects of global warming by acting as a store of Carbon. The planting of more trees could also help make sure the existing defences are protected from the risks of climate change. Sub-question 4 asks "How could changes in land use in the Wansbeck catchment area reduce the risk of flooding?" and it has been shown that increasing the proportion of forestry in the catchment area could sig reduce the risk of flooding in towns such as Morpeth. Forestry can have a positive effect on biodiversity, they can also improve soil, reduce pollution and improve water quality and so on.
Currently the majority of land in the study area is used for grazing and the most important question in this study is "why is grazing favoured as a land use over forestry when forestry clearly has greater environmental benefits?" I think the reason landowners favour grazing over forestry is obviously economic. The financial gains from sheep grazing must be higher than those from forestry. Even in this situation this there is a lot which could be done to make the land use more sustainable. Farmers could be offered money to plant more forestry, they could be given more training or education in forestry and further research into methods of diversification which includes tourism and forestry could be done. Forestry can also have great social benefits such as recreation and health and and it can help generate further economic gains in the wider tourism industries.
Overall my conclusion is that there are many factors which could affect the rates of flooding in the River Wansbeck and land use is the most important factor. With the effects of global warming getting worse year on year we should be looking at forestry as a way of reducing the risk of flooding.

Commentary

A study of the physical and human causes of the flooding on the River Wansbeck.

Area 1: Introduction and preliminary research (10 marks)

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

The student identifies ideas that are relevant to the investigation on the CRF. The selection of the study area and the geographical context are all suitable but the student has failed to state the sub-parts of the enquiry clearly in the introduction. A single sub-question is identified but the title lacks a clear focus. The links to the specification are articulated to some extent but there is no explicit reference to specification content.

Level 2 – low

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

The student has used some relevant literature in the investigation. The soils and geology maps are clear and relevant to the enquiry and the Forest Research article is an appropriate use of secondary material. The sources have not been credited accurately with some articles failing to be referenced at all, or important details like title/author omitted. Some are Wikipedia sources. As in a) the student does demonstrate some understanding of the theoretical and comparative context but it has been referenced poorly and expressed inconsistently.

Level 2

Level 2

4 marks

Area 2: Methods of field investigation (15 marks)

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

The student has selected four appropriate methods for collecting primary data. The teacher advises on the CRF form the student should incorporate some qualitative methods but this advice has not been taken (although this in itself doesn't reduce marks). The teacher also advises the student to consider the number of sites bearing in mind the size of the study area and this advice has been taken. The justification of sampling strategy is basic. Sampling is simply referred to by name without any clear understanding shown. Overall the justification of approaches is quite limited although some elements are clearer. The details of size of sample, timings, frequency, etc, are not stated consistently.

Level 2

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

The methods are appropriate and descriptions are provided for the four primary methods of data collection, some of which are quite clear. The application of secondary data is suitable, although description of methods is lacking here.

Level 3 – low

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

The student clearly experienced difficulties with the method for measuring slope angle, seeming to adapt the method during the course of collecting data and some credit should be given for working out an alternative to the use of the clinometer. However the data collected is not representative of the whole catchment. The infiltration methodology was appropriate but clearly the method is quite unreliable, leading to further complications for the student. The primary data for soil was not presented later in the report.

Level 2

Level 2

7 marks

Area 3: Methods of critical analysis (20 marks)

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

The student has presented data in an appropriate way. The use of line graphs, presenting mean, range and percentages is satisfactory; however there is no evidence of more complex methods of analysis such as measures of dispersion. Where secondary data has been applied its link to the primary data is not expressed clearly. There is some appropriate use of geospatial technologies although analysis of maps is lacking.

Level 2

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

The student demonstrates a good understanding of the anomalies in the infiltration study and is able to suggest sensible explanations. There is some geographical understanding here but the student does not fully interpret the data or discuss links between data sets.

Level 2

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

Throughout the investigation the student demonstrates he/she has some understanding of the appropriate geographical concepts but there are very few instances of this being expressed clearly. There are few “threads” running though the enquiry, for example the sub-questions or the interrelated nature of drainage basin systems.

Level 2

Level 2

7 marks

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

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

Generally written in sequence although there are some basic errors. Some graphs are drawn accurately and the digital information is presented clearly. Overall the route to enquiry is logical.

Level 2

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

The student begins to discuss the wider applications of the investigation, making sensible suggestions relating to the original purpose of the investigation. However the evaluation of methods is weak-some credit for details in the methodology table. The ethical dimensions of the research are alluded to, but this element lacks clarity.

Level 2

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

The inconsistent and poorly referenced use of secondary evidence and the weak analysis overall means that the conclusion is not particularly coherent. The conclusion is adequate but poorly linked to the existing theories and represents only a partially argued case. The student has, however managed to use appropriate methods to collect a broad base of primary evidence to answer a geographical question. The geographical question has been partially answered.

Level 2

Level 2

6 marks

Overall

Area 1: 4
Area 2: 7
Area 3: 7
Area 4: 6

Total: 24

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E: geography@aqa.org.uk

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