



GCE A level

1204/01

GEOGRAPHY – G4
Sustainability

P.M. MONDAY, 16 June 2014

1 hour 45 minutes

ADDITIONAL MATERIALS

In addition to this question paper, you will need the Resource Folder and a pink WJEC 20 page book, which has been specifically designed for this examination. No other style of answer book should be used. Should you run out of space, use a standard 4 page continuation book.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

Answer **all** questions.

Write your answers in the separate answer book provided, following the instructions on the front of the answer book.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication used in your answers.

You are reminded that this paper is synoptic and so will assess your ability to draw on your understanding of the connections between the different aspects of the subject represented in the geography specification.

Even where not specifically asked for, you should support your answer with examples and/or case studies.

Answer all questions.

SECTION A

*In this section you may use information from the **Resource Folder** and your own research.*

- 0 1** Outline the physical factors affecting food production in **one or more** areas. [10]
(approximately 13 minutes)
- 0 2** Explain some of the ways in which food production may be increased. [10]
(approximately 13 minutes)
- 0 3** Outline reasons why some cities are growing in areal extent. [10]
(approximately 13 minutes)
- 0 4** 'Allowing cities to expand conflicts with maintaining sustainable food supplies.'
To what extent is this true? [25]
(approximately 33 minutes)

SECTION B

In this section you may use information from any of your studies for AS and A2 Geography as well as from the Resource Folder and your own research.

- 0 5** Describe some of the problems associated with supplying energy.
How far can managing energy demand sustainably help overcome problems of energy supply? [25]
(approximately 33 minutes)



GCE A level

1204/01-A

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Examination copy

To be given out at the start of the examination.

The pre-release copy must not be used.

RESOURCE FOLDER

1204
01A001

ADVICE TO CANDIDATES

In this synoptic exercise you will be assessed on your ability to **synthesise knowledge and understanding and skills** derived from your A level course.

You are reminded that assessment will take into account the quality of written communication used in your answers.

The main focus of the material in this Resource Folder is related to two cities, Cambridge and Norwich, and the areas immediately surrounding them. There is also information about food production in the UK and some ways in which it may be increased in the future.

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CITY GROWTH

Figure 1: Selected city growth in the UK, 2000–2010

City	Rank (out of 64) fastest growing = 1	Population 2000	Population 2010	Annual percentage growth
Cambridge	2	109 900	125 700	1.35
Norwich	7	239 400	267 200	1.10
UK	-	58 886 100	62 262 000	0.56

Source: *Cities Outlook 2012*

Figure 2: The location of Cambridge and Norwich

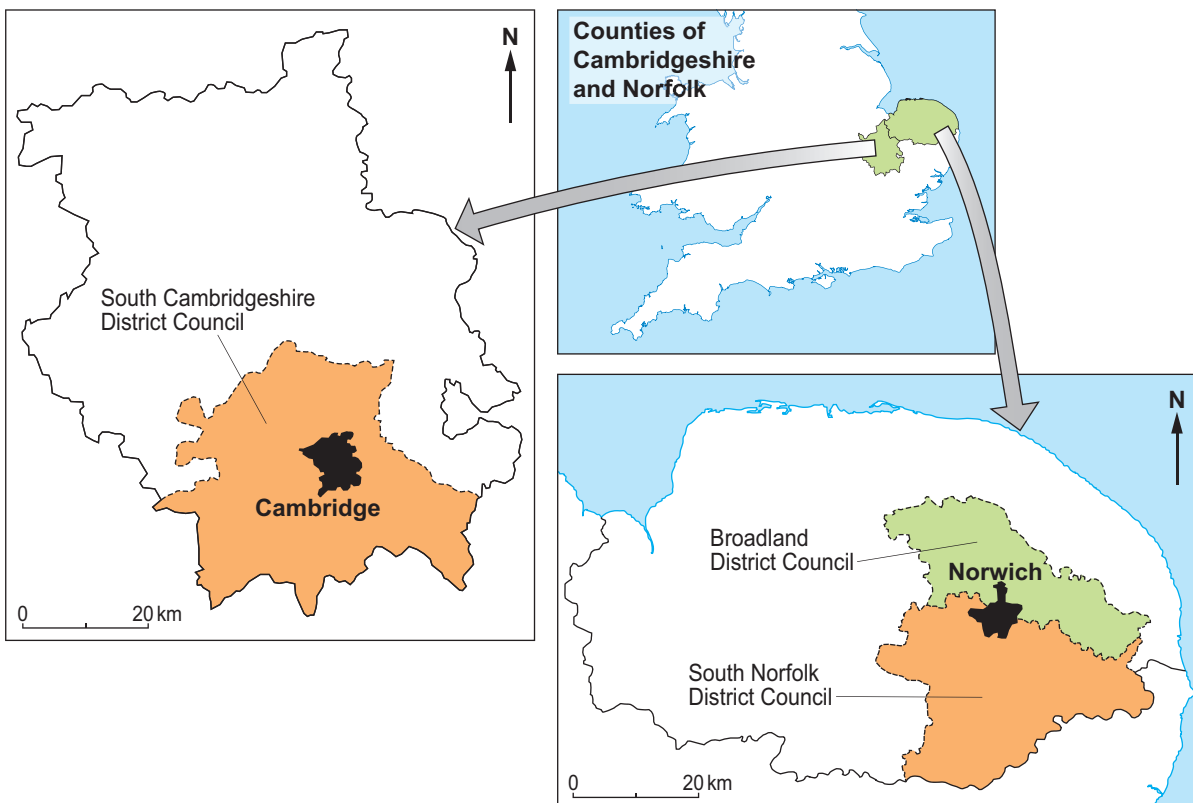
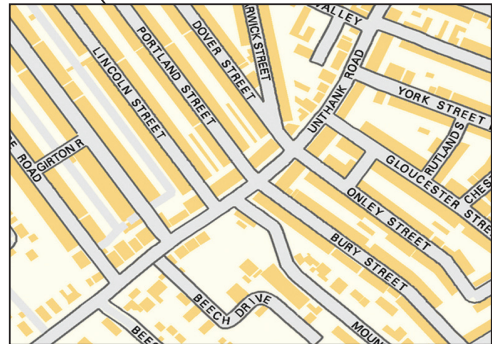
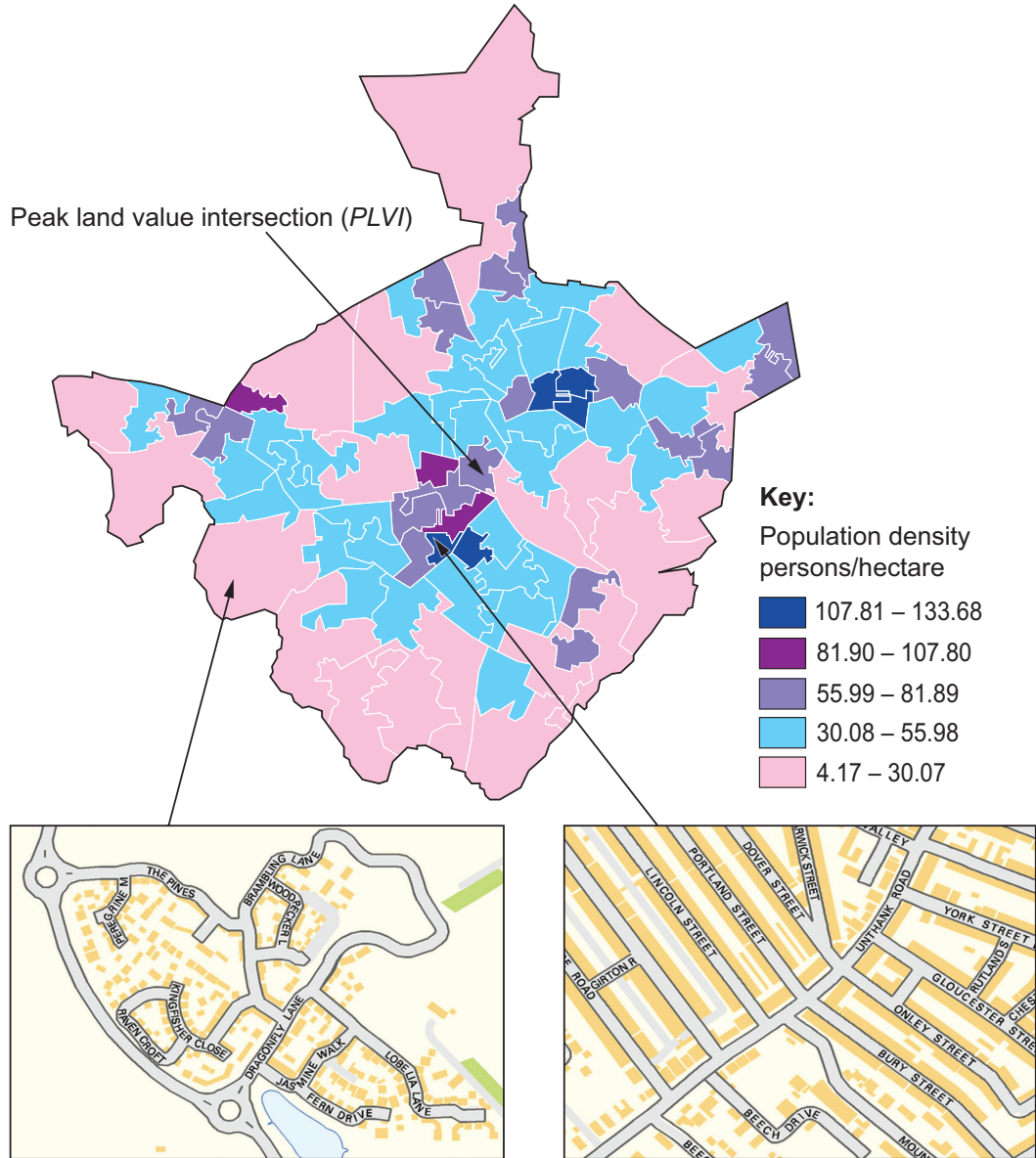


Figure 3: Projected household changes in England, 2008–2033

- The number of households in England is projected to grow to 27.5 million by 2033, an increase of 5.8 million (27%) over 2008, or 232 000 households per year.
- One person households are projected to increase by 159 000 per year, equating to two-thirds of the overall increase in households.
- By 2033, 19% of households in England are projected to be single person compared with 14% in 2008.
- By 2033, 33% of households will be headed by those aged 65 or over, up from 26% in 2008.

Source: www.communities.gov.uk

Figure 4: Population density in inner and outer areas of Norwich



Source: 2001 Census and www.ordnancesurvey.co.uk

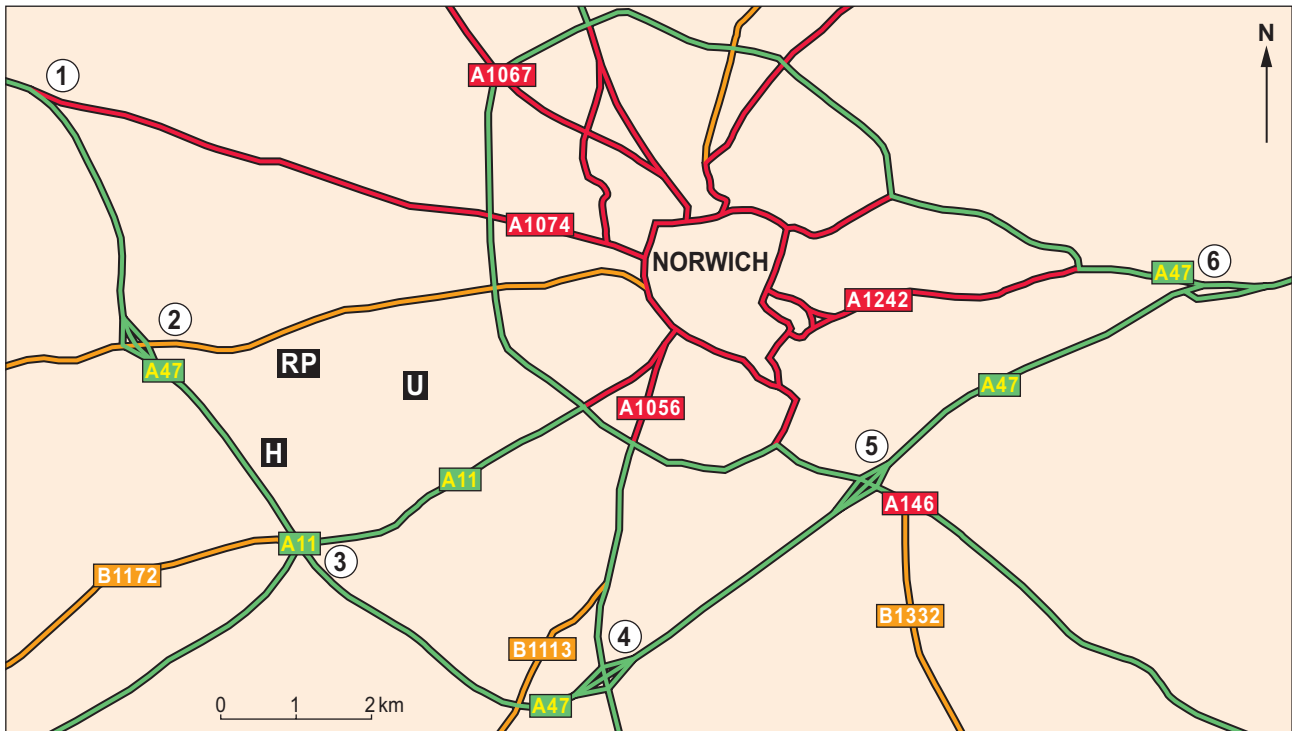
Figure 5: Options for accommodating city expansion**Brownfield sites**

- May be toxic waste
- Re-using land
- Buildings may need to be cleared
- Often near to city centres
- Local roads may be congested
- Access to existing water and electricity supplies

**Greenfield sites**

- Space to expand
- Take up agricultural land
- Near by-passes
- Depend on transport
- Pleasant environment
- May be objections

Figure 6: The southern by-pass around Norwich



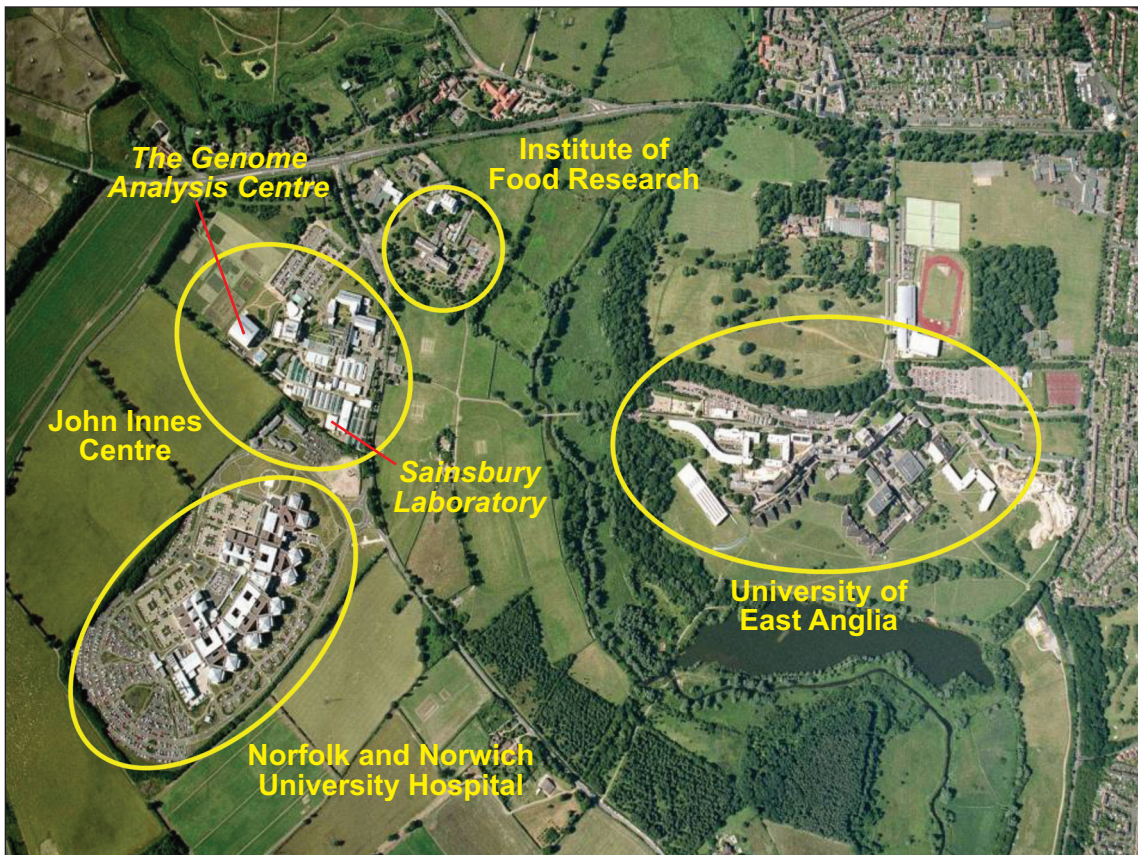
The A47 by-pass to the south of Norwich was completed in 1992. The section built is between numbers 1 and 6 which are intersections with other roads. The route covers former agricultural land. There has been extensive development at all intersections with the exception of 5. Most of the development has been in the form of retail parks, but light manufacturing and distribution services are a close second. 1, 3, 4 and 6 are locations for the park and ride service. Each of these has a very large car park to cope with present, and anticipated future, demand.

Although not at an intersection, the new by-pass created easy access to a new hospital (H) allowing ambulances to avoid congestion.

The ease of access, and plenty of room for expansion, attracted a large Research Park (RP). This was located close to the University of East Anglia (U). Many leading research institutions have located there, including the John Innes Centre, a world leader in crop research.

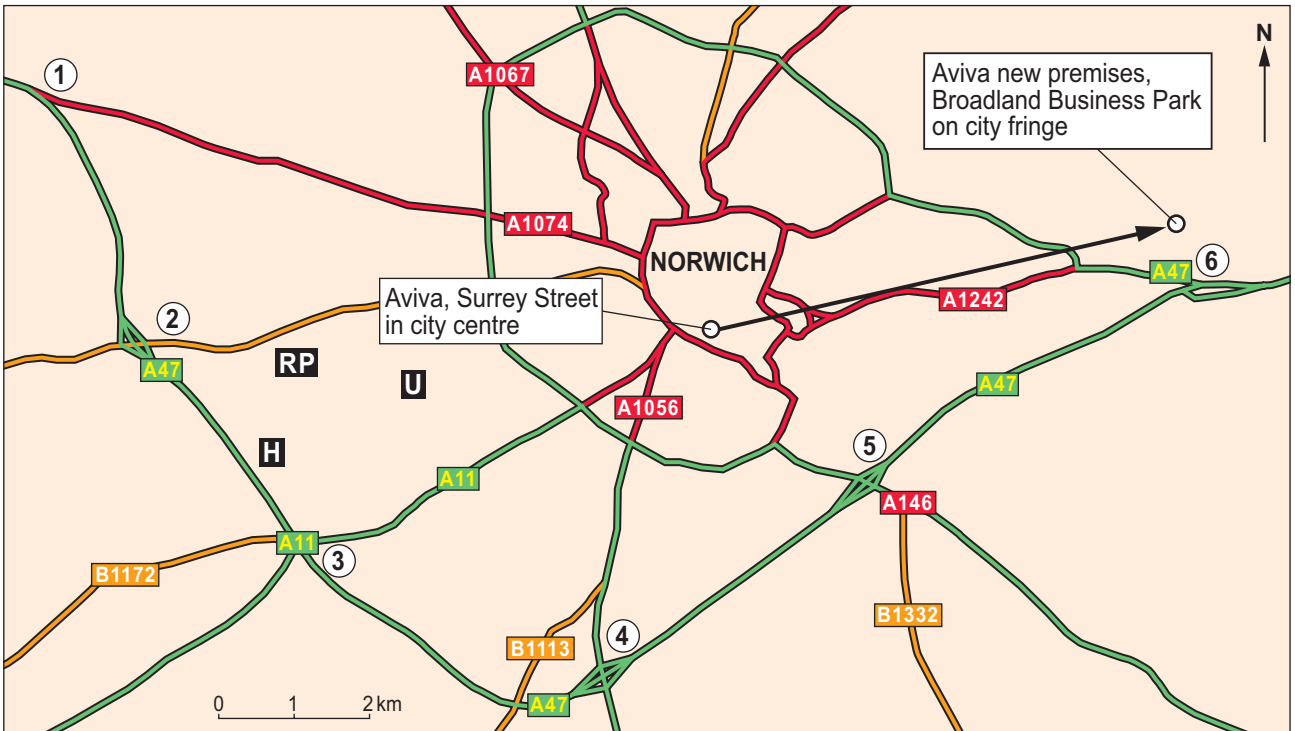
Source: adapted from a variety of sources

Figure 7: New developments on greenfield sites on the edge of Norwich



Source: www.norfolkfarmingconference.org/downloads/2012/Dale_Saunders.pdf

Figure 8: Relocation of part of Aviva's headquarters in Norwich



1204
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Surrey Street



Broadland Business Park

Source: adapted from a variety of sources

Figure 9: Actual and projected percentage population increase for Cambridge

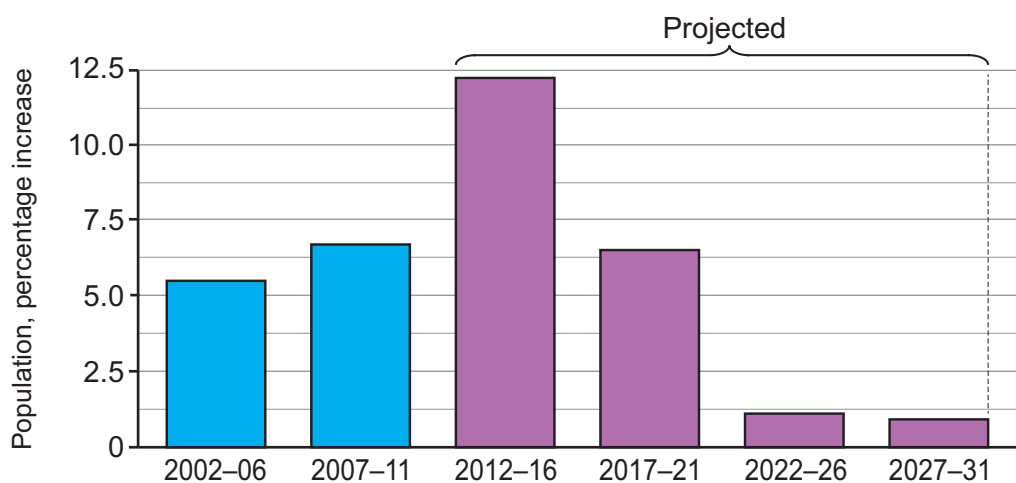
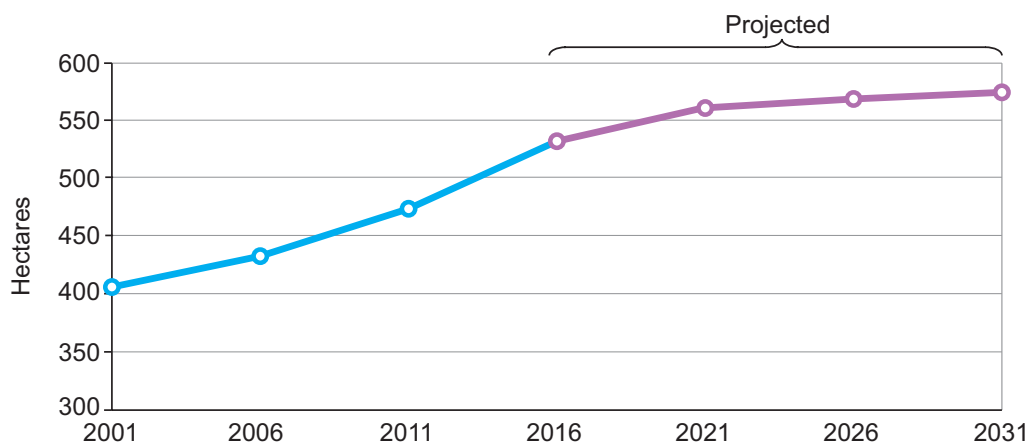


Figure 10: Actual and projected growth in areal extent of Cambridge, 2001–2031



Source: adapted from www.cambridgeshireinsight.org

Figure 11: Proposed new town in the Cambridge area



Key:

- Northstowe

Plans for Northstowe, the biggest new town in Britain since Milton Keynes, have been proposed, to include a 10 000 home development to the north-west of Cambridge.

The town, which could take 20 years to complete and eventually be home to 25 000 people, will be built on a golf course, farmland and a former airfield.

Plans for the first phase of the town were submitted to South Cambridgeshire District Council in February 2012. They include a primary school, shops, sports centre and open spaces. Its 10 000 homes could provide about half the new homes the council say are necessary in the area by 2031.

Source: adapted from www.guardian.co.uk

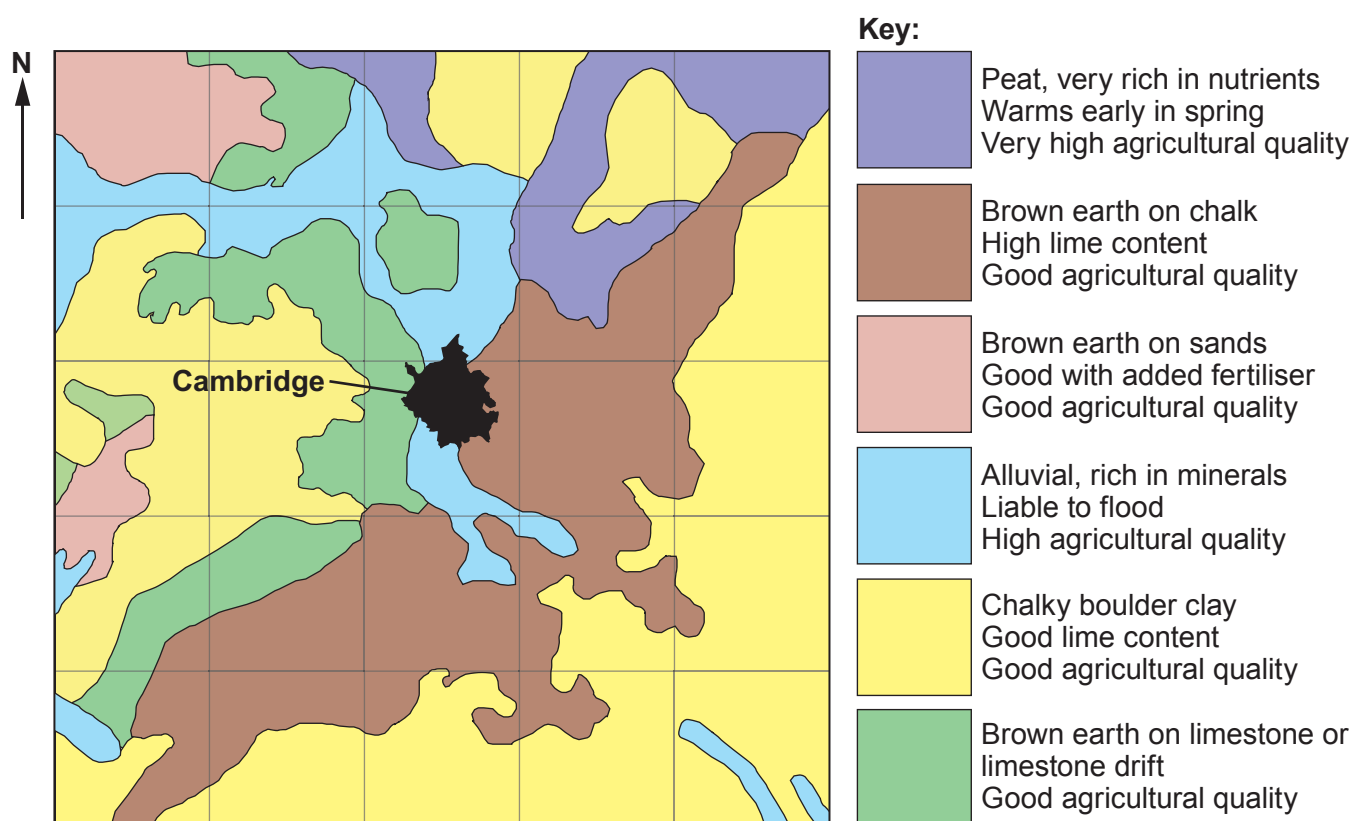
FOOD PRODUCTION

Figure 12: Mean monthly 30 year (1980–2010) climate information for the Cambridge area

	J	F	M	A	M	J	J	A	S	O	N	D
Temperature °C	4	4	7	8	12	15	17	17	15	11	7	5
Days with frost	10	10	5	3	1	0	0	0	0	1	5	8
Precipitation mm	45	33	42	43	45	54	38	49	51	54	51	50
Days with rain	10	8	10	9	8	9	7	7	8	8	10	10
Hours of sunshine	56	73	107	146	190	180	191	187	142	115	68	50

Source: adapted from www.metoffice.gov.uk

Figure 13: Soils in the area surrounding Cambridge



Each grid square covers 10km × 10km

Source: adapted from Soil Survey 1974, Rothamsted Research

Figure 14: Predicted precipitation variability for the Cambridge area

Current event frequency figures	Predicted event frequency		
	2040	2060	2080
2012			
1 in 30	1 in 16	1 in 13	1 in 11
1 in 20	1 in 12	1 in 10	1 in 8
1 in 10	1 in 6	1 in 5	1 in 4

The table shows how frequently, in years, extreme precipitation events (which may lead to flooding or drought) can be expected.

Source: www.ofwat.gov.uk

Figure 15: Requirements to produce selected foodstuffs consumed in the UK

Wheat

At least 600 mm precipitation
 Temperatures in 7–25°C range
 Spring planted 100–130 growing days
 Autumn planted 180–250 growing days

UK (thousand tonnes)
 Production 15257
 Export 318
 Import 902



Rice



At least 1000 mm precipitation
 Temperatures in 20–40°C range
 30–50 days as seedlings
 70–100 days as mature plants

UK (thousand tonnes)
 Production 0
 Export 0
 Import 322

Poultry

No requirements for precipitation provided a water source is available
 Can tolerate up to 24°C daily mean, may need shelter under 8°C
 Ready for food processing between 5 and 26 weeks
 Can breed throughout the year

UK (thousand tonnes)
 Production 1298
 Export 227
 Import 339



Figure 15: Requirements to produce selected foodstuffs consumed in the UK (continued)

Haricot beans (for baked beans)

At least 700 mm precipitation
 Temperatures in 19–28°C range
 Currently will not tolerate frost
 90–120 days from sowing to harvest

UK (thousand tonnes)
 Production 0
 Export 0
 Import 183



Potatoes



At least 500 mm precipitation
 Needs 150 mm per month whilst growing
 Temperatures in 6–25°C range
 120–150 days from planting to lifting

UK (thousand tonnes)
 Production 6 115
 Export 554
 Import 1 670

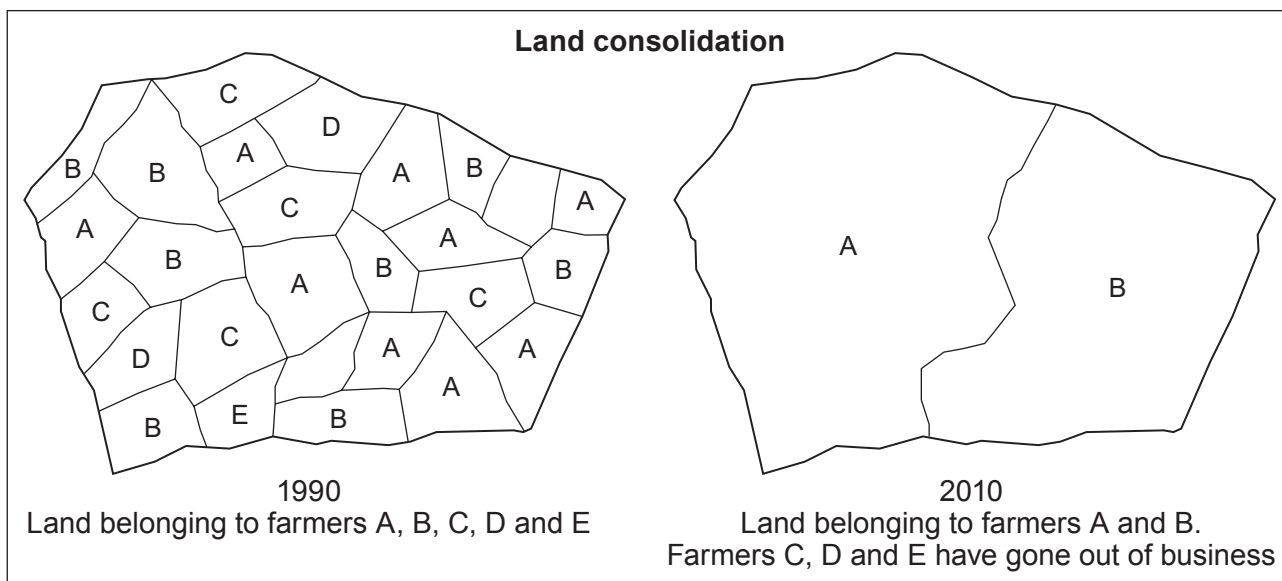
Bananas

At least 900 mm precipitation
 Temperatures in 27–30°C range for optimum growth
 Growth stops below 13°C
 300–450 days from planting but can continue production when mature

UK (thousand tonnes)
 Production 0
 Export 0
 Import 927



Figure 16: Selected improvements in agriculture that have been widely adopted



Genetic modification

Control of pests

Bt maize (a genetically modified crop) is affected by four main insect pests - stemborers, aphids, moths and weevils.

Modification has allowed control of these four types to be achieved as follows:

- excellent control of 1 pest
- good control of 2 pests
- some control of 1 pest
- no control of other types



Irrigation




Drip



Jet

Sources: adapted from www.oecd.org; www.tamilnet.com; www.bia.gov; <http://newschoolthoughtsonafrica.files.wordpress.com>; www.crida.in and www.countryfarm-lifestyles.com

Figure 16: Selected improvements in agriculture that have been widely adopted (continued)



Growing under plastic

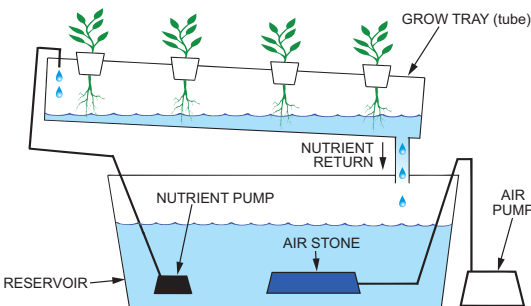
- Temperature and humidity can be raised under plastic sheets.
- Evapotranspiration can be reduced.
- High demand for labour created.
- Many protests arise about plastic sheets being unsightly in areas of great natural beauty.


Source: hortsci.ashspublications.org

Figure 17: Selected methods of increasing food production with scope for expansion

Hydroponics

- Plants indoors with roots in nutrient solution optimised for the species.
- Artificial lighting and temperature can be adjusted.
- Largely disease and pest free environment.
- Allows growth of crops unsuited to local environment.

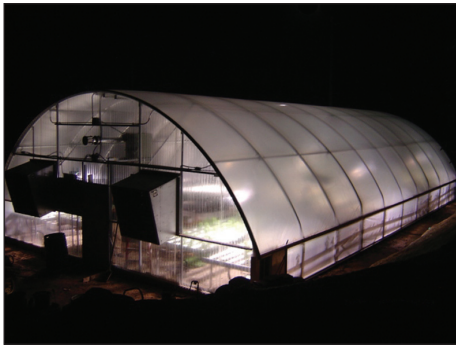





Aeroponics

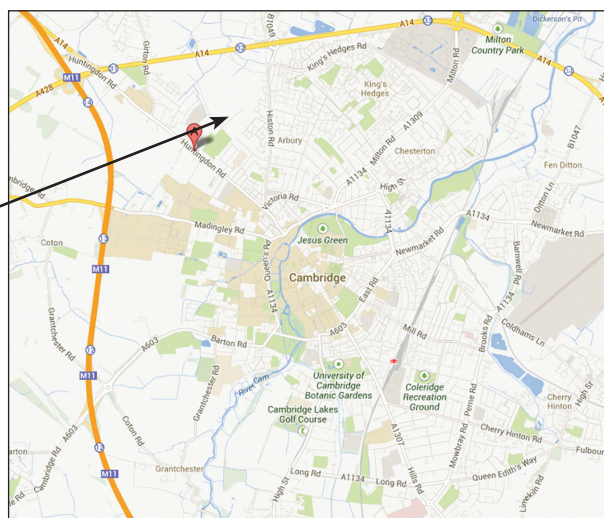
- Similar to hydroponics but considered more productive for same inputs.
- Plants grown with roots suspended in the air.
- Nutrient solutions sprayed onto the roots at controlled times in optimum amounts.
- As with hydroponics, set up and running costs high especially for energy supplies.

Growing through the night

Source: www.hytechhydroponics.co.uk

Figure 18: Example of plant research on the fringe of Cambridge



The four challenges of Innovation Farm



**Sustainable
resources**

- Reduce inputs, e.g. disease resistance
- Input efficiency e.g. drought tolerance
- Improving biodiversity, e.g. stewardship schemes
- Alternative energy sources, e.g. willow
- Supplying specialist markets, e.g. pharmaceuticals and fibres



**Food
security**

- Increase crop yields
- Extend growing seasons
- Improve frost resistance
- Extend growing areas
- Improve nutritional content



**Health and
nutrition**

- Improve digestibility for humans and animals
- Healthy characteristics e.g. high in antioxidants
- Improve quality
- Pharmaceutical properties, e.g. combat the effects of Alzheimer's

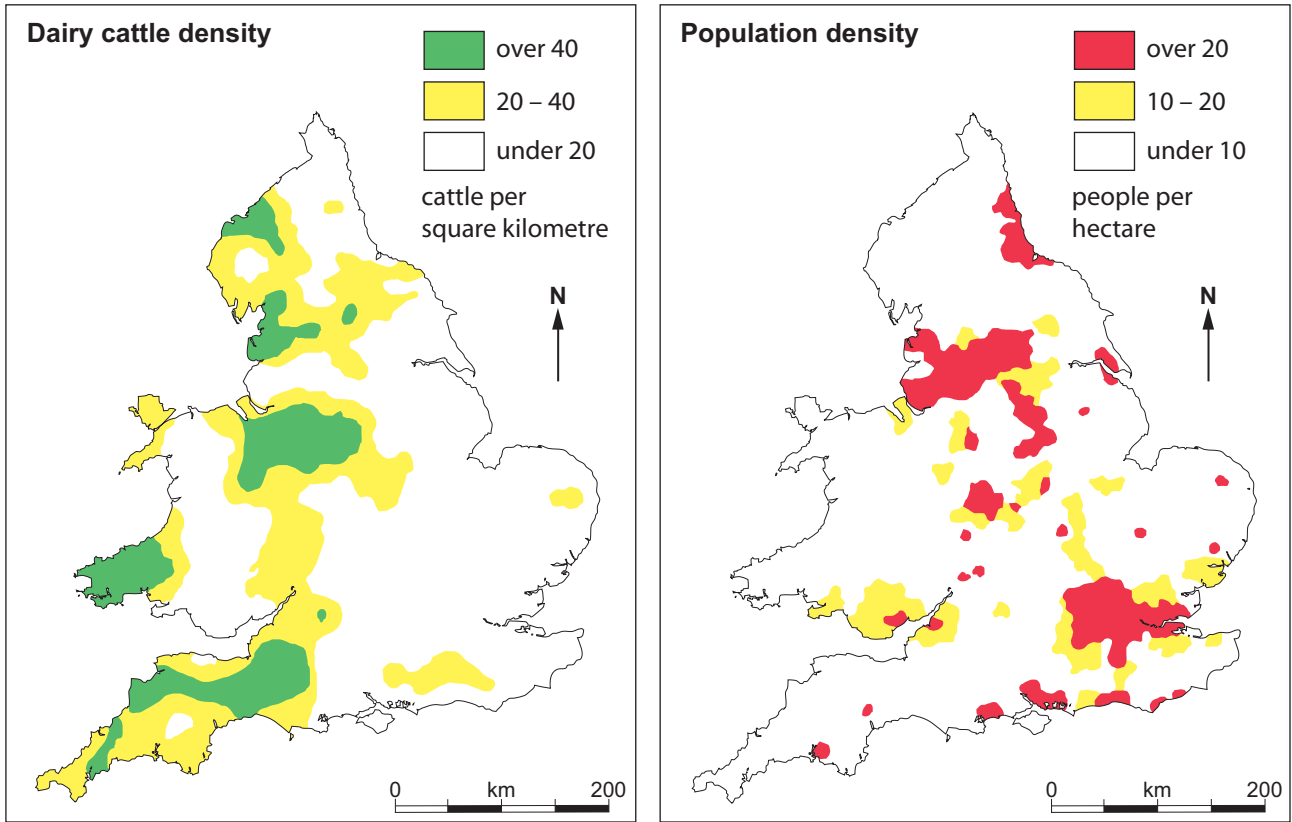


**Climate
change**

- Resistance to new pests arriving from other climates
- Increase genetic diversity to cope with change
- Suitability of inputs to changed cultivation
- Work undertaken to give consistent yield under variable climatic conditions
- Improvements to suit new UK climatic conditions, e.g. soya beans

Source: www.innovationfarm.co.uk

Figure 19: Density of dairy cattle and population density in England and Wales



Source: adapted from www.defra.gov.uk & <http://data.gov.uk>

Figure 20: Some sources of imported food to the UK



Kenyan fine beans destined for UK supermarkets



Egyptian potatoes available at times when they cannot be produced in the UK



Source: www.archive.defra.gov.uk

Sources of information and copyright

Figure 1	https://www.centreforcities.org/outlook12.html
Figure 3	www.communities.gov.uk/documents/statistics/pdf/1780763.pdf
Figure 4	www.ons.gov.uk www.ordnancesurveyleisure.co.uk
Figure 7	www.norfolkfarmingconference.org/content/post.aspDale_Sanders.pptx
Figures 9 & 10	www.cambridgeshireinsight.org.uk/population-and-demographics/population-estimates-and-forecasts
Figure 11	www.guardian.co.uk/environment/2012/feb/27/cambridgeshire-ecotown-plans-resubmitted
Figure 12	www.metoffice.gov.uk/climate/uk/ee/prinMet Office/Regional Climate/Eastern England
Figure 13	Soil survey 1974.pdf. Map from Rothamsted Research
Figure 14	www.ofwat.gov.uk/sustainability/climatechange/rpt_com_met_rainfall.pdf
Figure 15	Images: Windu, Signature Photos, Ladywewa, Oriori, LianeM, Dani Vincek, Moving Moment, Zbynek Burival, Maria Meester, T.W van Urk, Stephen Coburn / Shutterstock.com
Figure 16	www.hortsci.ashpublications.org www.bia.gov/WhoWeAre/BIA/ILCA/index.html Indian Affairs/ILCP http://newschoolthoughtsonafrica.files.wordpress.com/2010/11/bt_maize_fields_s.jpg Stemborer http://www.crida.in/naip/comp4/images/yellowstemborer.jpg http://www.countryfarm-lifestyles.com/images/Maize-Weevil.jpg www.tamilnet.com/art.html?catid=86&artid=15843# (2xphotos)
Figure 17	www.hytechhydroponics.co.uk/how-hydroponic-systems-work/nft.gif
Figure 18	www.innovationfarm.co.uk
Figure 19	www.defra.gov.uk/publications/files/pb13572-cattlebook-2008-090804.pdf http://data.gov.uk/dataset/population_density
Figure 20	www.independent.co.uk/news/world/africa/kenyas-quos-green-beans-hit-uk-supermarket-shelves-2067630.html?action=gallery&ino=1010-kenya-khe-mwea-group-far.jpg weekly.ahram.org.eg/2009/963/ec2.htmeco01.jpg large-cargo-planes.com/category/air-cargo/jet-air-cargo2.jpg



GCE A level

1204/01-B

GEOGRAPHY – G4
Sustainability

**Pre-Release Material for examination
on 16 June 2014.**

To be opened on receipt.

**A new copy of this Folder will be
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RESOURCE FOLDER

1204
01B001

INSTRUCTIONS TO CANDIDATES

A new copy of this Folder will be given out in the examination. This copy must not be taken into the examination.

Work through this Folder to make sure you understand all the resources. You may seek help from your teachers or any other sources in this context. You have to apply your critical understanding to an unfamiliar situation.

ADVICE TO CANDIDATES

The information in this folder relates to two cities, Cambridge and Norwich, and the areas immediately surrounding them. There is also information about food production in the UK and some ways in which it may be increased in the future.

Guidelines for using the pre-release materials

The contents of the booklet should be studied carefully. The examples given will help in answering some of the questions on the question paper. To give a fuller answer, it is advisable to look at other material before the examination. This could be similar topics, related to information in other countries, or may be the same countries but in greater depth or on closely related topics. It would be particularly useful to note if other case studies seem similar in nature, or if they show contrasting perspectives to those from the material in this Resource Folder.

Some of the resource materials come from Geography textbooks, but others come from companies, pressure groups, research organisations, governments and private individuals. In some cases they are using information to promote their own interests rather than to represent an impartial view. It is worth considering if they are trying to support a particular interest group and persuade readers to agree with them. In finding other materials, it is worth bearing in mind that they might not be presented in an impartial and objective way.

Material in the Resource Folder may often be related to other themes found in G4, and to other units in Geography AS and A2. These links should be noted, as there will be opportunities to refer to such connections with other work in some of your answers. Being able to link together different parts of your Geography studies is important and will be credited. Such linkages are sometimes referred to as 'synopticity'.

Textbooks, journals, good quality newspapers and television and radio programmes are good sources of information. Probably the most accessible source of geographical information is the Internet, but it is also the one which may be most susceptible to bias and lack of impartiality. Many of the resources are extracted or adapted from sources on the Internet. These sources have the web addresses provided only for copyright reasons. Many are only extracts or shortened versions of fuller documents and some may be inaccessible by the date of the release of this Resource Folder. Following some of these links for greater depth of reading and for more recent updates of material can be helpful but is not essential. It is **not** the intention that by providing these web addresses every one listed is researched.

Each candidate will be provided with a copy of the Resource Folder, for use in the examination, at the same time as the question paper is issued at the beginning of the examination on the day set for the paper.

Copies of the Resource Folder with added notes, or notes from research carried out in the previous six weeks, may not be taken into the examination.

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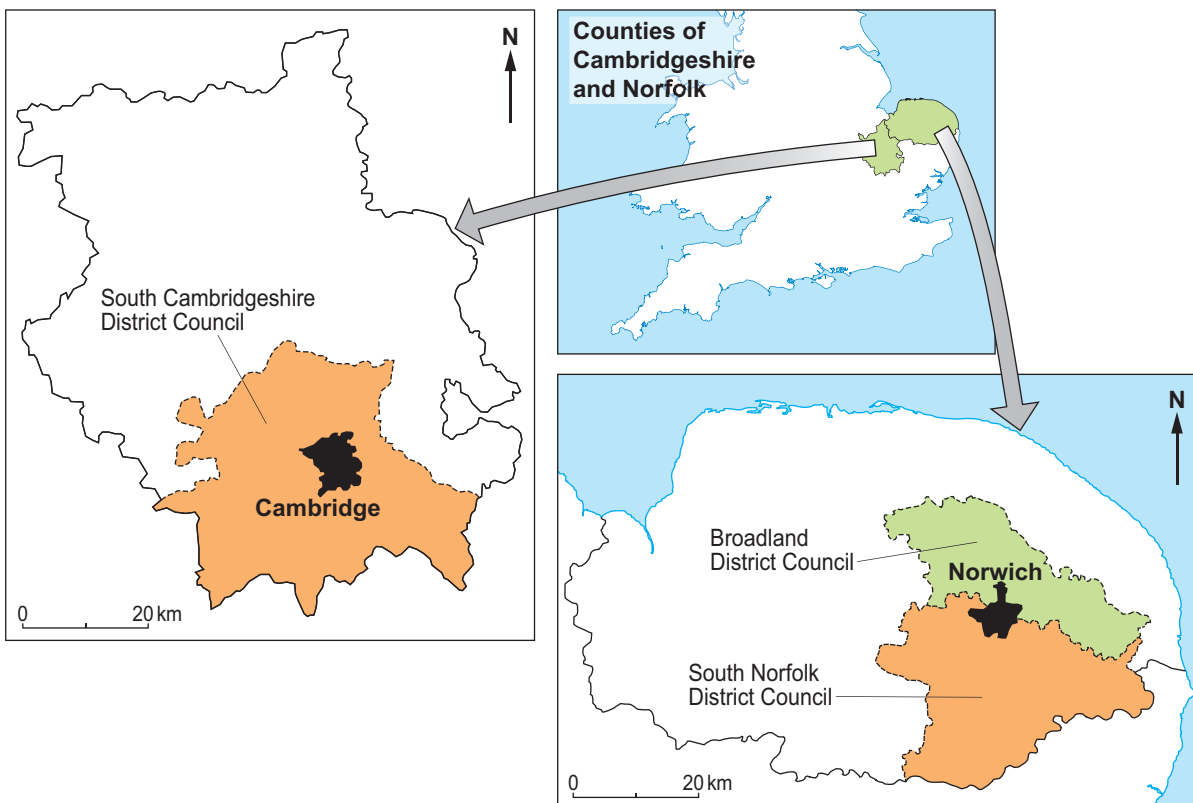
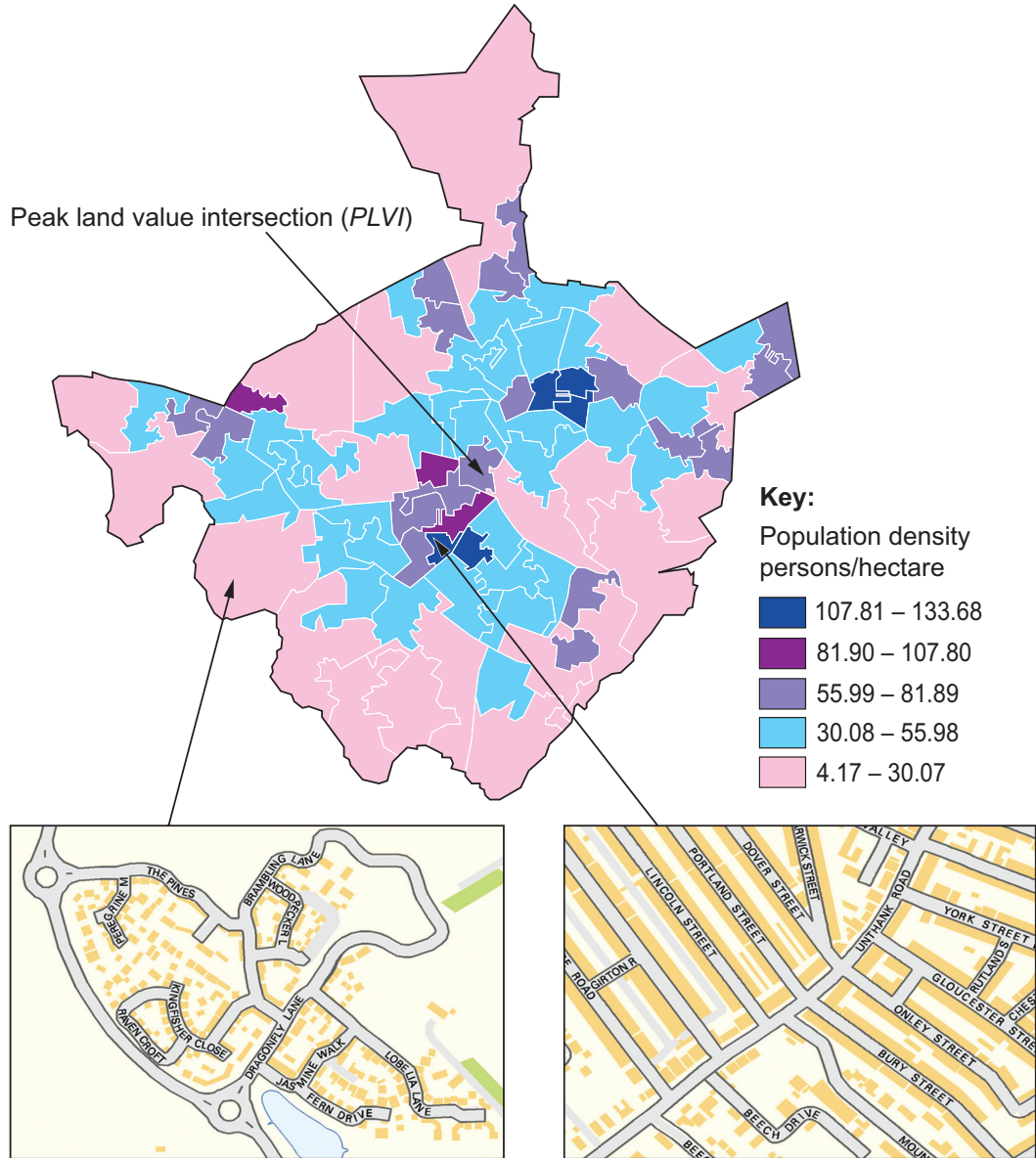


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Source: www.communities.gov.uk

Figure 4: Population density in inner and outer areas of Norwich



A - Recent urban fringe housing estate

Population density 15 persons/hectare



B - 19th century inner city centre housing

Population density 112 persons/hectare



Source: 2001 Census and www.ordnancesurvey.co.uk

Figure 5: Options for accommodating city expansion



Brownfield sites

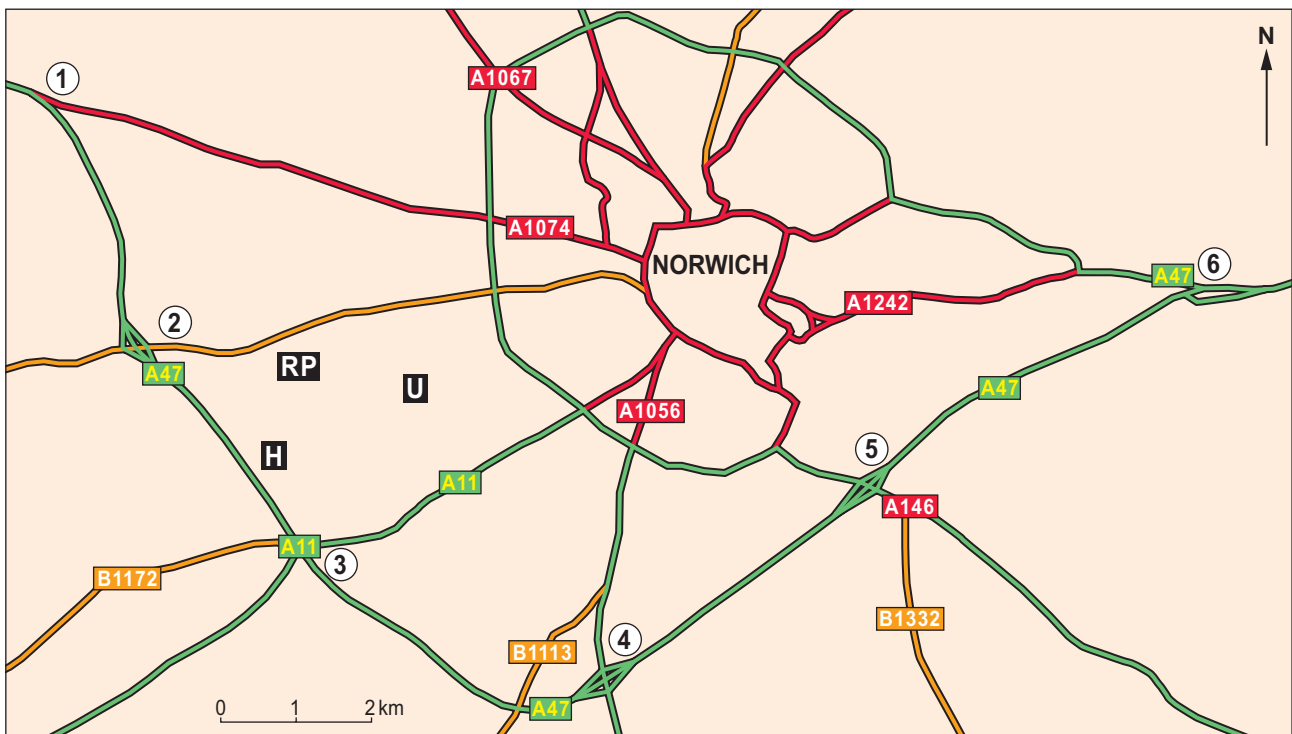
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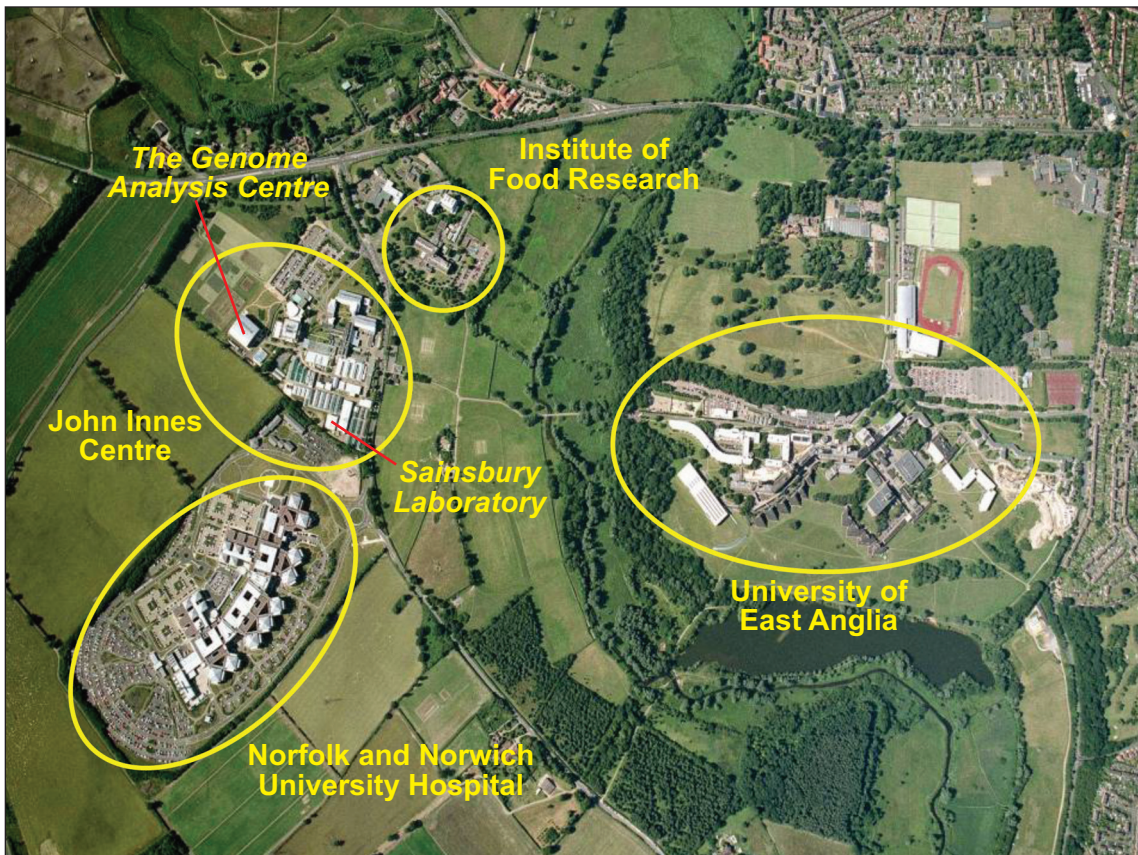
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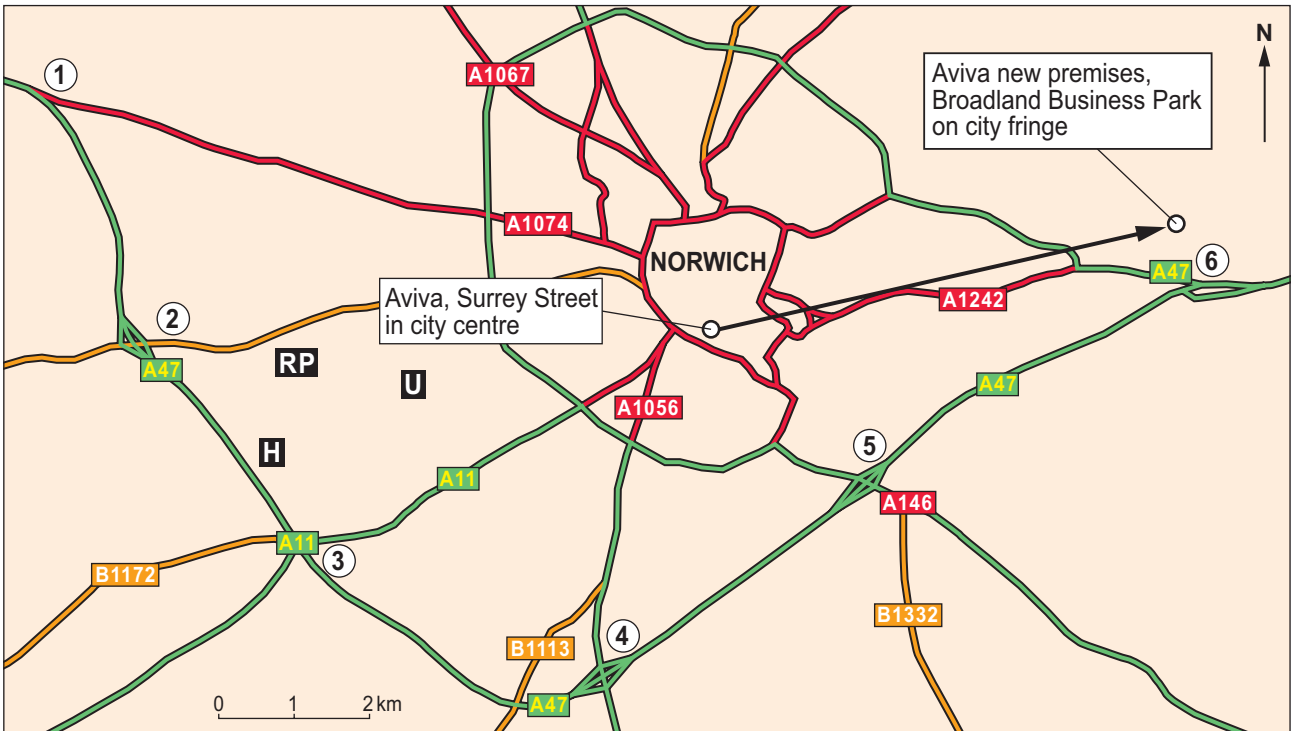
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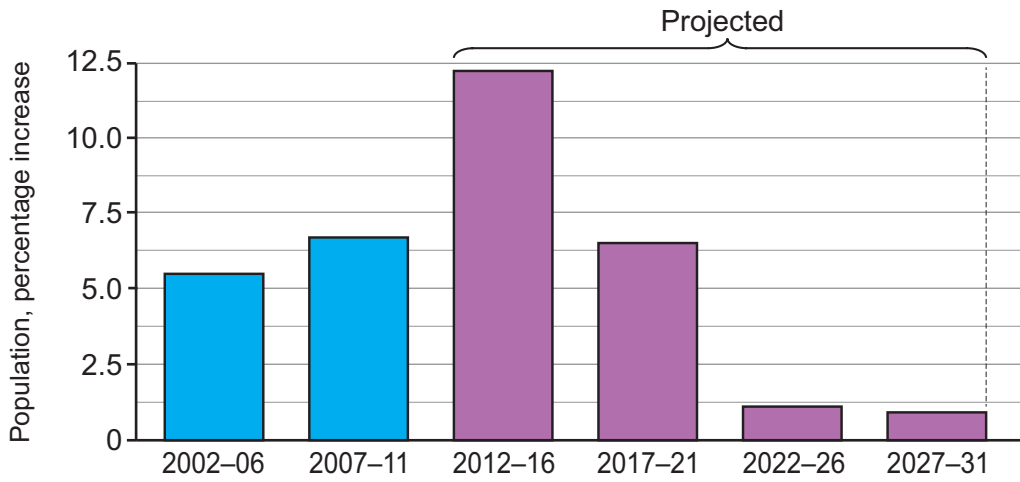
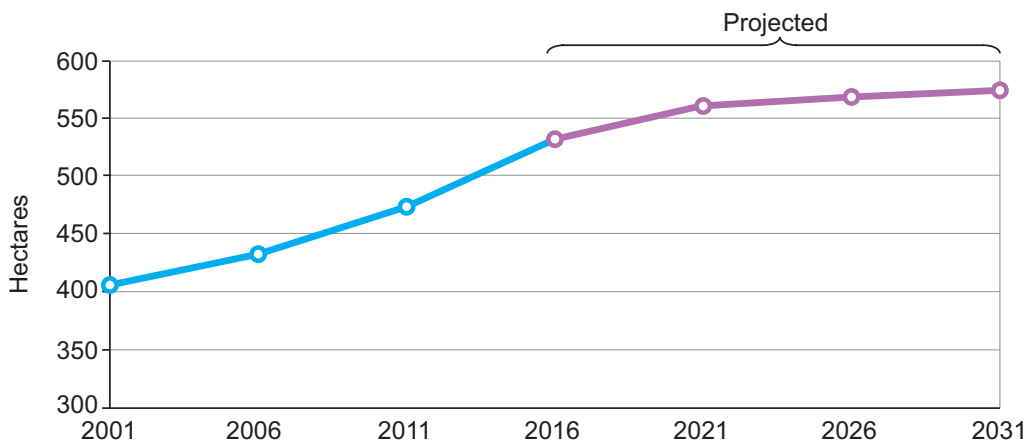


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Source: adapted from www.cambridgeshireinsight.org

Figure 11: Proposed new town in the Cambridge area



Key:

- Northstowe

Plans for Northstowe, the biggest new town in Britain since Milton Keynes, have been proposed, to include a 10 000 home development to the north-west of Cambridge.

The town, which could take 20 years to complete and eventually be home to 25 000 people, will be built on a golf course, farmland and a former airfield.

Plans for the first phase of the town were submitted to South Cambridgeshire District Council in February 2012. They include a primary school, shops, sports centre and open spaces. Its 10 000 homes could provide about half the new homes the council say are necessary in the area by 2031.

Source: adapted from www.guardian.co.uk

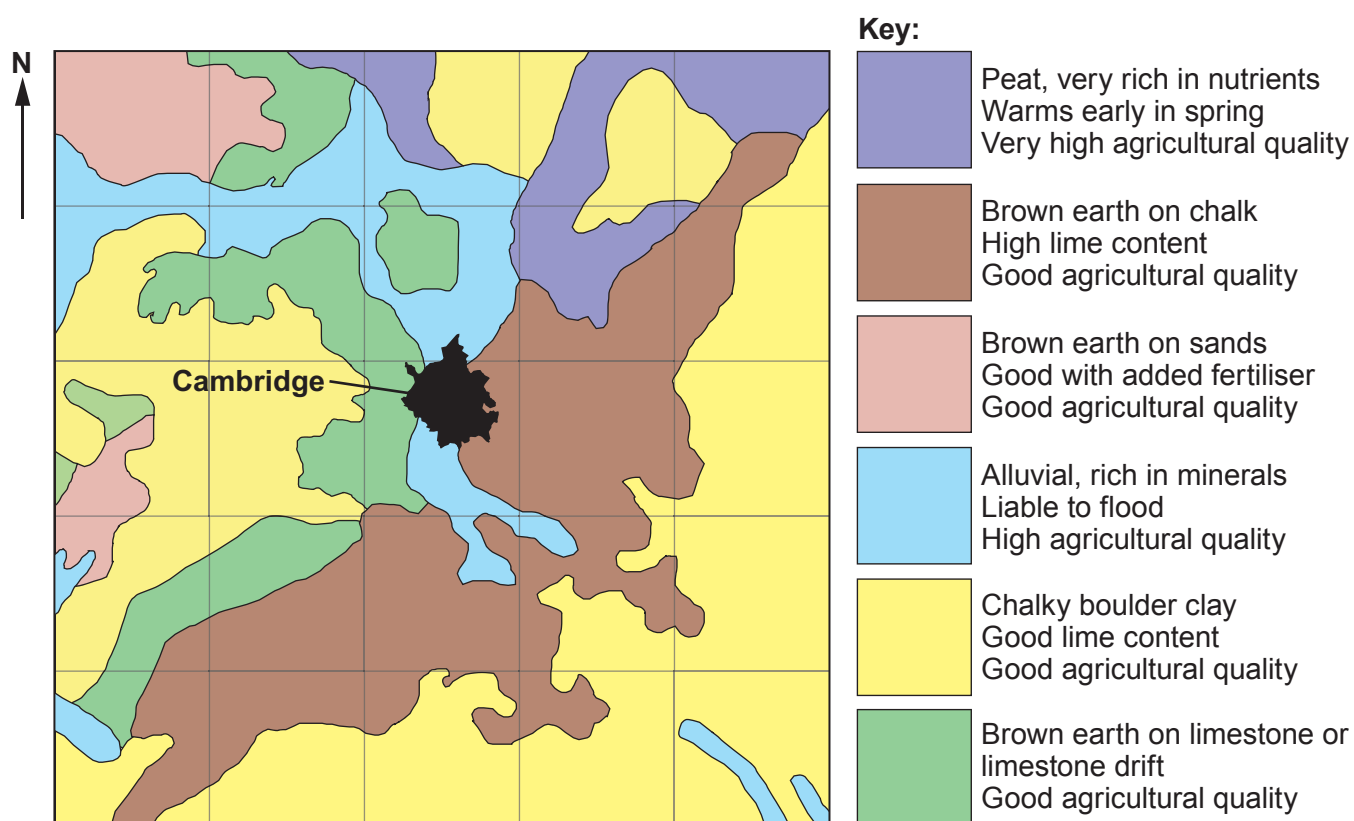
FOOD PRODUCTION

Figure 12: Mean monthly 30 year (1980–2010) climate information for the Cambridge area

	J	F	M	A	M	J	J	A	S	O	N	D
Temperature °C	4	4	7	8	12	15	17	17	15	11	7	5
Days with frost	10	10	5	3	1	0	0	0	0	1	5	8
Precipitation mm	45	33	42	43	45	54	38	49	51	54	51	50
Days with rain	10	8	10	9	8	9	7	7	8	8	10	10
Hours of sunshine	56	73	107	146	190	180	191	187	142	115	68	50

Source: adapted from www.metoffice.gov.uk

Figure 13: Soils in the area surrounding Cambridge



Each grid square covers 10km × 10km

Source: adapted from Soil Survey 1974, Rothamsted Research

Figure 14: Predicted precipitation variability for the Cambridge area

Current event frequency figures	Predicted event frequency		
	2040	2060	2080
2012			
1 in 30	1 in 16	1 in 13	1 in 11
1 in 20	1 in 12	1 in 10	1 in 8
1 in 10	1 in 6	1 in 5	1 in 4

The table shows how frequently, in years, extreme precipitation events (which may lead to flooding or drought) can be expected.

Source: www.ofwat.gov.uk

Figure 15: Requirements to produce selected foodstuffs consumed in the UK

Wheat

At least 600 mm precipitation
 Temperatures in 7–25°C range
 Spring planted 100–130 growing days
 Autumn planted 180–250 growing days

UK (thousand tonnes)
 Production 15257
 Export 318
 Import 902



Rice



At least 1000 mm precipitation
 Temperatures in 20–40°C range
 30–50 days as seedlings
 70–100 days as mature plants

UK (thousand tonnes)
 Production 0
 Export 0
 Import 322

Poultry

No requirements for precipitation provided a water source is available
 Can tolerate up to 24°C daily mean, may need shelter under 8°C
 Ready for food processing between 5 and 26 weeks
 Can breed throughout the year

UK (thousand tonnes)
 Production 1298
 Export 227
 Import 339



Figure 15: Requirements to produce selected foodstuffs consumed in the UK (continued)**Haricot beans (for baked beans)**

At least 700 mm precipitation
 Temperatures in 19–28°C range
 Currently will not tolerate frost
 90–120 days from sowing to harvest

UK (thousand tonnes)
 Production 0
 Export 0
 Import 183

**Potatoes**

At least 500 mm precipitation
 Needs 150 mm per month whilst growing
 Temperatures in 6–25°C range
 120–150 days from planting to lifting

UK (thousand tonnes)
 Production 6 115
 Export 554
 Import 1 670

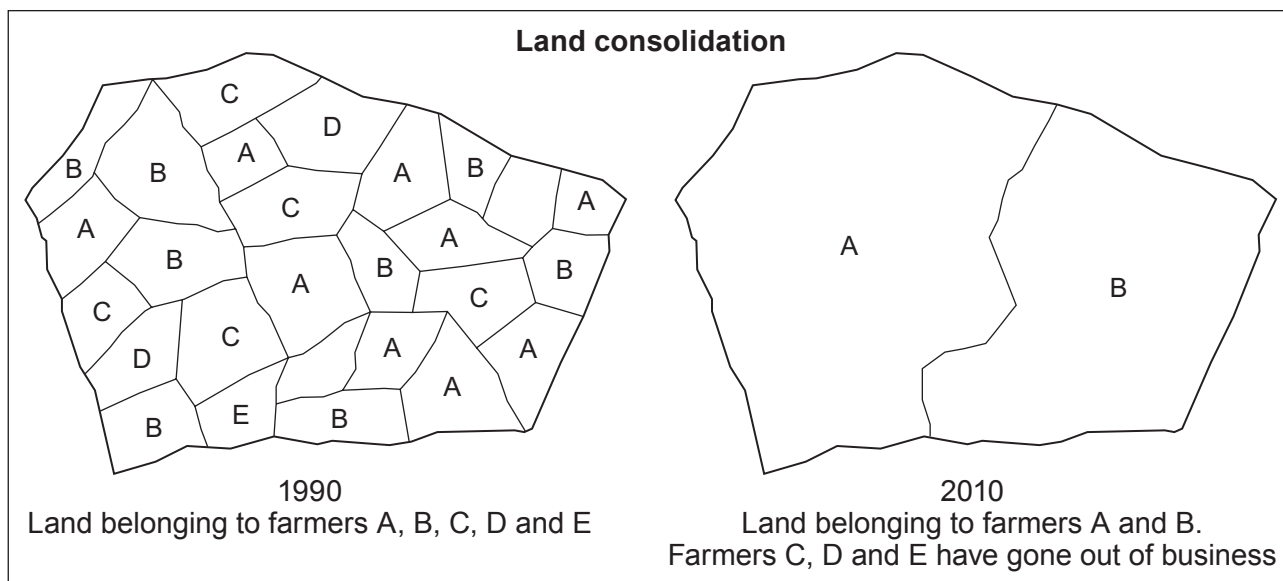
Bananas

At least 900 mm precipitation
 Temperatures in 27–30°C range for optimum growth
 Growth stops below 13°C
 300–450 days from planting but can continue production when mature

UK (thousand tonnes)
 Production 0
 Export 0
 Import 927



Figure 16: Selected improvements in agriculture that have been widely adopted



Genetic modification

Control of pests

Bt maize (a genetically modified crop) is affected by four main insect pests - stemborers, aphids, moths and weevils.

Modification has allowed control of these four types to be achieved as follows:

- excellent control of 1 pest
- good control of 2 pests
- some control of 1 pest
- no control of other types



Irrigation




Drip



Jet

Sources: adapted from www.oecd.org; www.tamilnet.com; www.bia.gov; <http://newschoolthoughtsonafrica.files.wordpress.com>; www.crida.in and www.countryfarm-lifestyles.com

Figure 16: Selected improvements in agriculture that have been widely adopted (continued)



Growing under plastic

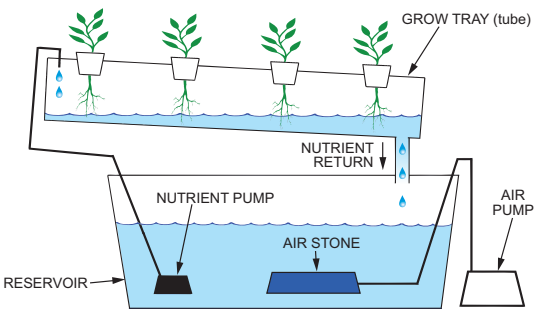
- Temperature and humidity can be raised under plastic sheets.
- Evapotranspiration can be reduced.
- High demand for labour created.
- Many protests arise about plastic sheets being unsightly in areas of great natural beauty.


Source: hortsci.ashspublications.org

Figure 17: Selected methods of increasing food production with scope for expansion

Hydroponics

- Plants indoors with roots in nutrient solution optimised for the species.
- Artificial lighting and temperature can be adjusted.
- Largely disease and pest free environment.
- Allows growth of crops unsuited to local environment.

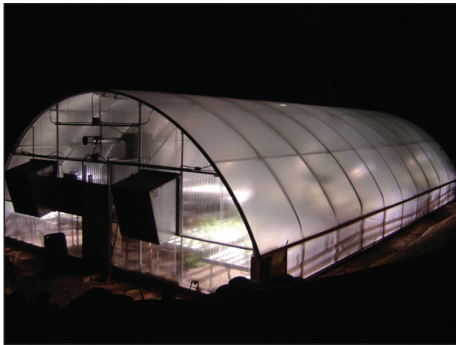





Aeroponics

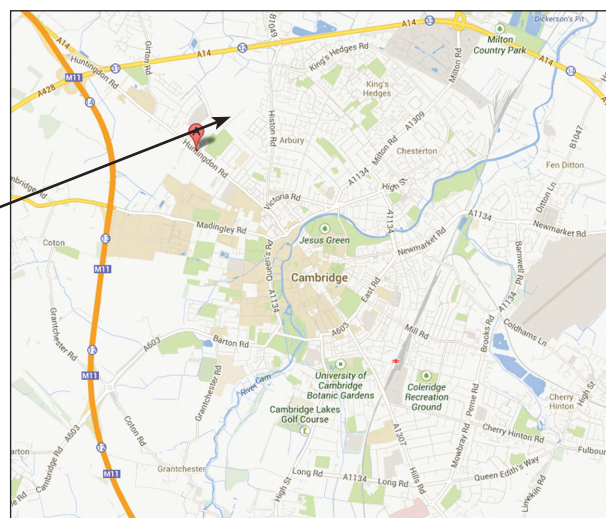
- Similar to hydroponics but considered more productive for same inputs.
- Plants grown with roots suspended in the air.
- Nutrient solutions sprayed onto the roots at controlled times in optimum amounts.
- As with hydroponics, set up and running costs high especially for energy supplies.

Growing through the night

Source: www.hytechhydroponics.co.uk

Figure 18: Example of plant research on the fringe of Cambridge



The four challenges of Innovation Farm



**Sustainable
resources**

- Reduce inputs, e.g. disease resistance
- Input efficiency e.g. drought tolerance
- Improving biodiversity, e.g. stewardship schemes
- Alternative energy sources, e.g. willow
- Supplying specialist markets, e.g. pharmaceuticals and fibres



**Food
security**

- Increase crop yields
- Extend growing seasons
- Improve frost resistance
- Extend growing areas
- Improve nutritional content



**Health and
nutrition**

- Improve digestibility for humans and animals
- Healthy characteristics e.g. high in antioxidants
- Improve quality
- Pharmaceutical properties, e.g. combat the effects of Alzheimer's

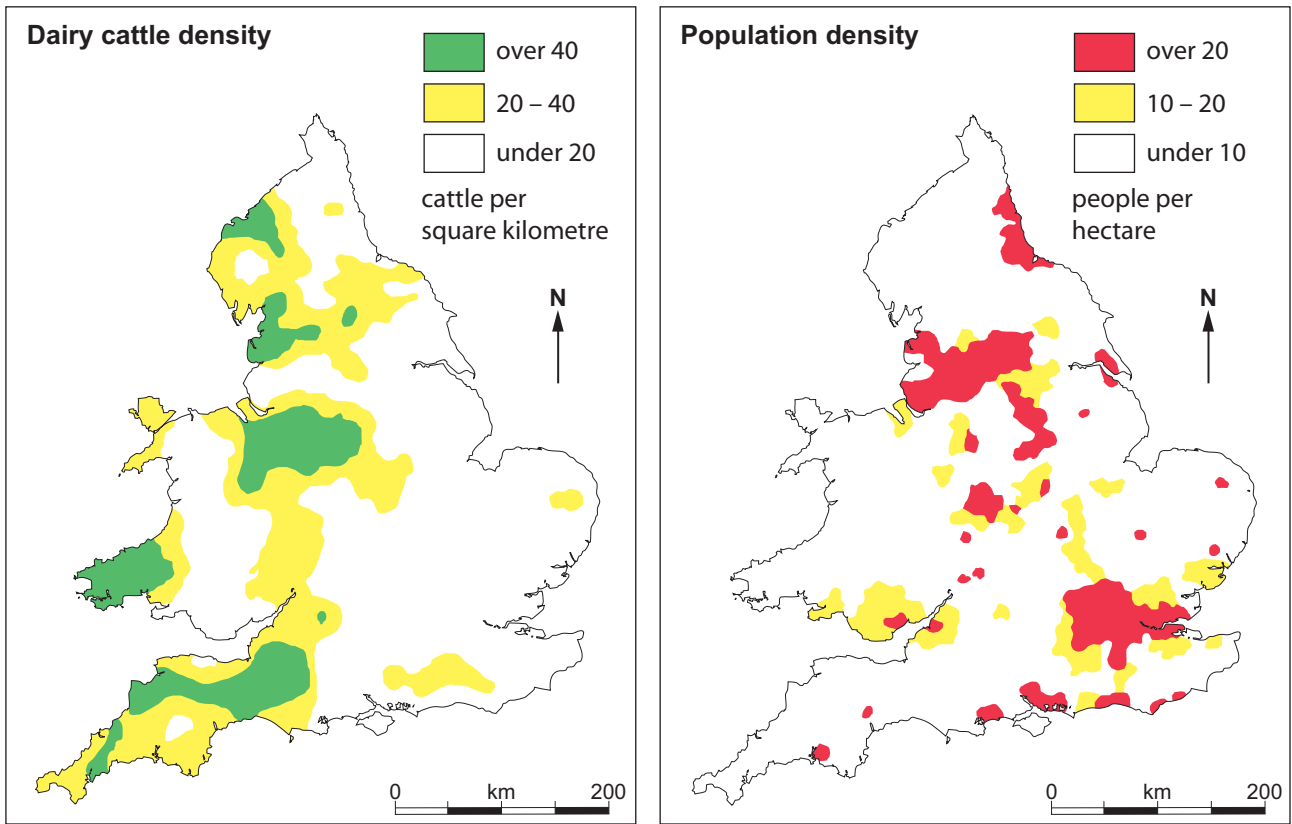


**Climate
change**

- Resistance to new pests arriving from other climates
- Increase genetic diversity to cope with change
- Suitability of inputs to changed cultivation
- Work undertaken to give consistent yield under variable climatic conditions
- Improvements to suit new UK climatic conditions, e.g. soya beans

Source: www.innovationfarm.co.uk

Figure 19: Density of dairy cattle and population density in England and Wales



Source: adapted from www.defra.gov.uk & <http://data.gov.uk>

Figure 20: Some sources of imported food to the UK



Kenyan fine beans destined for UK supermarkets



Egyptian potatoes available at times when they cannot be produced in the UK



Source: www.archive.defra.gov.uk

Sources of information and copyright

Figure 1	https://www.centreforcities.org/outlook12.html
Figure 3	www.communities.gov.uk/documents/statistics/pdf/1780763.pdf
Figure 4	www.ons.gov.uk www.ordnancesurveyleisure.co.uk
Figure 7	www.norfolkfarmingconference.org/content/post.aspDale_Sanders.pptx
Figures 9 & 10	www.cambridgeshireinsight.org.uk/population-and-demographics/population-estimates-and-forecasts
Figure 11	www.guardian.co.uk/environment/2012/feb/27/cambridgeshire-ecotown-plans-resubmitted
Figure 12	www.metoffice.gov.uk/climate/uk/ee/prinMet Office/Regional Climate/Eastern England
Figure 13	Soil survey 1974.pdf. Map from Rothamsted Research
Figure 14	www.ofwat.gov.uk/sustainability/climatechange/rpt_com_met_rainfall.pdf
Figure 15	Images: Windu, Signature Photos, Ladywewa, Oriori, LianeM, Dani Vincek, Moving Moment, Zbynek Burival, Maria Meester, T.W van Urk, Stephen Coburn / Shutterstock.com
Figure 16	www.hortsci.ashpublications.org www.bia.gov/WhoWeAre/BIA/ILCA/index.html Indian Affairs/ILCP http://newschoolthoughtsonafrica.files.wordpress.com/2010/11/bt_maize_fields_s.jpg Stemborer http://www.crida.in/naip/comp4/images/yellowstemborer.jpg http://www.countryfarm-lifestyles.com/images/Maize-Weevil.jpg www.tamilnet.com/art.html?catid=86&artid=15843# (2xphotos)
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