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Geography

Duration — 2 hours and 15 minutes

Total marks — 60

SECTION 1 — PHYSICAL ENVIRONMENTS — 15 marks
Attempt ALL questions.

SECTION 2 — HUMAN ENVIRONMENTS — 15 marks
Attempt ALL questions.

SECTION 3 — GLOBAL ISSUES — 20 marks
Attempt TWO questions.

SECTION 4 — APPLICATION OF GEOGRAPHICAL SKILLS — 10 marks
Attempt the question.

Credit will be given for appropriately labelled sketch maps and diagrams.

Write your answers clearly in the answer booklet provided. In the answer booklet you must clearly identify the question number you are attempting.

Use blue or black ink.

Before leaving the examination room you must give your answer booklet to the Invigilator; if you do not you may lose all the marks for this paper.
SECTION 1: PHYSICAL ENVIRONMENTS — 15 marks

Attempt ALL questions

Question 1
Explain why there is a surplus of solar energy in the tropical latitudes and a deficit of solar energy towards the poles. You may wish to use an annotated diagram or diagrams in your answer. 5

Question 2
Look at Diagram Q2 which shows a coastal area in the UK.
Explain, with the aid of a diagram or diagrams, how feature A was formed. 5

Diagram Q2: Pembrokeshire coast

Question 3
Explain ways in which human activity can affect the hydrological cycle. 5
SECTION 2: HUMAN ENVIRONMENTS — 15 marks

Attempt ALL questions

Question 1
Explain the problems of conducting a census in a developing country such as Nigeria. 5

Question 2
Referring to either a rainforest or semi-arid area you have studied, explain the consequences of land degradation on the people and environment. 6

Question 3
For any named developed world city you have studied, explain methods which have been introduced to manage traffic in the Central Business District. 4
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</table>
Question 1 — River Basin Management
Study Diagrams Q1A, Q1B, Q1C and Q1D.

(a) Explain why there is a need for water management in the Missouri River Basin.

Diagram Q1A:
USA spring flood risk 2012

Diagram Q1B:
USA July temperatures 2012

Diagram Q1C: Missouri River Basin

Table Q1D: Population Upper Missouri River Basin

<table>
<thead>
<tr>
<th>Metropolitan Areas</th>
<th>2010</th>
<th>2013</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Great Falls</td>
<td>81,327</td>
<td>82,384</td>
<td>+1.3</td>
</tr>
<tr>
<td>Micropolitan Areas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bozeman</td>
<td>89,513</td>
<td>94,720</td>
<td>+5.8</td>
</tr>
<tr>
<td>Helena</td>
<td>74,801</td>
<td>76,850</td>
<td>+2.7</td>
</tr>
<tr>
<td>TOTAL</td>
<td>164,314</td>
<td>171,570</td>
<td>+4.4</td>
</tr>
<tr>
<td>Rest of Basin</td>
<td>65,542</td>
<td>64,053</td>
<td>+0.8</td>
</tr>
<tr>
<td>Montana</td>
<td>989,415</td>
<td>1,015,165</td>
<td>+2.6</td>
</tr>
</tbody>
</table>

Source: U.S. Census Bureau, Population Division

(b) For any named water management scheme you have studied, explain the positive impacts on the people and environment of the area.
Question 2 — Development and Health

Look at Diagram Q2.

Explain how primary health care strategies can improve the health and development of a developing country.

Diagram Q2: Mobile health clinic, South Africa

The mobile clinic is equipped with medical essentials.
Question 3 — Global Climate Change

Look at Diagram Q3.

(a) Discuss the human causes of global warming.

(b) Explain the global impacts of global warming.

Diagram Q3: Changes in Arctic summer ice 1979–2012
Question 4 — Trade, Aid and Geopolitics

Explain why aid from developed countries is often more beneficial to the donor country than the receiving country.
Question 5 — Energy

"Unlike fossil fuels, the wind, the Sun and the Earth itself provide fuel that is free, in amounts that are effectively limitless."

Quote – AL GORE

Look at the quote above. With reference to named countries, discuss the suitability of generating electricity from renewable resources.
Question 1

It has been proposed to build a new nuclear facility close to the decommissioned* nuclear plant at Sellafield (*no longer produces nuclear power). Working to the brief below, a 618 acre site, directly north of the current plant, on the outskirts of the Lake District National Park, has been proposed.

**Brief for new nuclear facility**

- The site should:
  - have minimal impact on the landscape, environment, people and wildlife
  - flat land to build on
  - have good transportation routes
  - a workforce nearby.

Study the O.S. Map Extract: 1787/89 and Diagrams Q1—Q5.

Referring to map evidence and other information from the sources, evaluate the **suitability of the proposed site** in relation to the brief for the new nuclear facility close to Sellafield.
Diagram Q2: View of proposed site
(Taken from Cold Fell (058092) — within the Lake District National Park)

Diagram Q3: Sellafield wins 8 safety awards

Sellafield Ltd has won eight awards in the prestigious RoSPA Occupational Health and Safety Awards 2015. The company has recently recorded one of its best ever safety performances. “It makes me very proud to be able to say that despite being one of the most complex nuclear sites in the world, we are also one of the safest, and that is not by chance. As one of the largest industrial sites in Europe with some very unique challenges, our attention to detail and relentless focus on delivering our mission safely means that we have an excellent safety record.” Head of Safety for the company, Pete Oldfield said.

Diagram Q4: View of anti-nuclear campaigner

Anti-nuclear campaigner Janine Allis-Smith’s son was diagnosed with leukaemia in 1983. She is convinced he was exposed to radiation during family trips to the Cumbrian seaside. Janine says: “He put handfuls of mud and sand on his head and face. I’m sure Sellafield has something to do with it. I know lots of children who’ve died and whose fathers worked at Sellafield. The graveyard at a church near Newbiggin has lots of graves of children who died in the sixties, seventies and eighties. It was not just leukaemia, but other cancers. Some were stillborn, while other suffered unexplained deaths at a very young age.”
THE Lake District News

ALL ABOUT THE BIG WORLD WE LIVE IN EXCLUSIVE NEWS TODAY

BEACHES NEARS SELLAFIELD CONTAMINATED WITH OVER 1,200 RADIOACTIVE HOTSPOTS

"Dangerous Particles May Remain Undetected"

A record number of radioactive hotspots have been found contaminating public beaches near the Sellafield nuclear complex in Cumbria, according to a report by the site’s operator.

As many as 383 radioactive particles and stones were detected and removed from seven beaches in 2010–11, bringing the total retrieved since 2006 to 1,233.

Although Sellafield insists that the health risks for beach users are “very low”, there are concerns that some potentially dangerous particles may remain undetected and that contamination keeps being found.

"Beaches Should Be Closed"

Anti-nuclear campaigners have called for beaches to be closed, or for signs to be erected warning the public of the pollution. But the government’s Health Protection Agency (HPA) has said “no special precautionary actions are required at this time to limit access to, or use of, beaches.”

[END OF MODEL PAPER]
General Marking Information for the Model Papers

When answering a question, you should ensure that you read the question carefully before you start. You should look at the command word to ensure you answer the question correctly, e.g. if the question asks you to explain, then you must give reasons to support your response. Remember that there are no describe questions so, if your answers do not contain more than a descriptive point, it will be difficult to achieve any marks. If a question asks for two points of view to be covered, for example, advantages and disadvantages, then both must be covered for full marks. If the question is out of six and only the advantages are covered, then a maximum mark of four or five might be awarded. If a named area or example is asked for, then you may lose a mark(s) if you give a general response to the question. There are often more points covered (worth a mark each) in the following answers than will be required. For example, there could be six or seven points listed for a five-mark answer. Since the question is only worth five marks then any five of the six points could gain the five marks.

## HIGHER FOR CIE GEOGRAPHY

### MODEL PAPER 1

### Section 1: Physical Environments

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<th>Specific Marking Instructions for this question</th>
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<tr>
<td>1.</td>
<td>Between the Equator and the tropics, the sun’s rays have less atmosphere to travel through, so less energy is lost through absorption and reflection (1). The rays of the sun cover a smaller area so are more concentrated, therefore, the intensity of insolation is higher here (1). At the poles, the earth is tilting away from the sun so the sun’s rays have to travel further through the atmosphere so energy covers a larger area, therefore, insolation is lower here (1). At the tropics, areas of dense vegetation like the rainforest absorb radiation, whereas at the poles areas are covered in snow, and ice reflects the incoming radiation back into the atmosphere (1). Rays have to spread out and travel through more atmosphere so are more diluted as the earth tilts away from the Sun (1).</td>
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<tr>
<td>2.</td>
<td>Fully annotated diagrams could achieve full marks. A headland is a piece of land which juts out into the sea and, where there are weaknesses in the rock, erosion takes place by processes including chemical weathering because of the salt in the water which helps corrode the cliff (1). The sheer force of the waves crashing against the cliffs can erode it; this is called hydraulic action, where air may become trapped in joints and cracks on a cliff face. When a wave breaks, the trapped air is compressed which weakens the cliff and causes erosion (1). The base of the cliff can become undercut through attrition, where stones and rocks are hurled against the rock wearing it away (1). Through time, the weaknesses in the rock become wider as the waves force their way into cracks in the cliff face. The water contains sand and other materials that grind away at the rock until the cracks become a cave (1). Continued hydraulic action by pounding waves on the roof of the cave forms a tube. Eventually, this breaks through the surface of the ground near the edge of the cliff. At high tide, incoming waves force water out of the top of the blowhole (1). Waves can attack the headland on both sides and erode back-to-back caves, which eventually meet, and an arch will form (1). During stormy weather or high tides, the archway will become weakened and eventually the roof cannot be supported and it collapses, leaving a tall pillar or rock isolated from the headland which is called a stack (1).</td>
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<td>3.</td>
<td>The removal of natural vegetation and replacement with impermeable concrete/hard surfaces and drains (1) can speed up overland flow and can lead to higher river levels (1). In urban areas, people remove trees and vegetation then cover soil in impermeable materials like tarmac or concrete which will increase surface run-off (1). This leads to higher river levels and increases the risk of flooding (1). It also reduces the amount of water which returns to groundwater storage and possibly reduces the water table (1). Deforestation means there are no tree leaves and roots to soak up precipitation, leading to increased run-off and the potential for soil erosion (1). Deforestation can lead to a decrease in evapo-transpiration rates which means less moisture going into the atmosphere so less cloud formation, and so less rainfall impacting on local rainfall patterns (1). Water removed from rivers and underground stores for irrigation results in reduced river flow and lowers the water table (1). The silting-up of lakes, rivers and reservoirs due to waste products and mining processes can result in reduced storage in these areas (1).</td>
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Section 2: Human Environments

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<tr>
<th>Question</th>
<th>Specific Marking Instructions for this question</th>
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<tr>
<td>1.</td>
<td>In countries like Nigeria, some politicians and government officials from certain regions alter the figures by adding people so that their region gets extra funds from the government budgets. This results in the census figures being higher than the actual population (1). The variety of languages spoken in many countries (e.g., over 500 in Nigeria) makes it difficult to provide forms which everyone can understand, so the form is either not filled in or completed inaccurately (1). A census is expensive, involving costs of printing, distributing and analysing results, which poor countries cannot afford, especially with increasing populations needing housing, health care and education (1). Rural–urban migration results in creation of shanty towns, e.g., Makoko in Lagos, Nigeria where many people have no address for the enumerator to deliver the census form to, or many people are homeless and sleep on streets moving frequently so large numbers of people are missed out (1). In the Amazon Basin, the local tribes are shifting cultivators. This may lead to people being missed or counted twice, and many cannot read and write (1). The dense rainforest has poor access, with few communication links. It’s difficult for an enumerator to reach, so people do not receive forms (1). In countries like China with a one-child policy, people lie about the number of children they have because they are afraid they will lose benefits or have to pay extra taxes (1).</td>
<td>5</td>
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<tr>
<td>2.</td>
<td>For full marks both people and the environment should be mentioned. Removal of the forest for mining, logging etc destroys the way of life of the indigenous people as their hunting area may be destroyed, leaving them short of food and forcing them to move further inland (1). The tribes use the land in a sustainable manner but loggers and miners destroy the area, completely preventing it from regenerating (1). Clashes between various competing groups occur, e.g., the violent death of Choco Mendez allegedly at the request of ranchers (1). Reduction of the fallow period, leading to reduced yields, leaves the population with less food (1). The using up of tribal land resulted in the creation of reserves for the indigenous people, causing unrest and conflict with the developers (1). The new settlers brought disease which the local people had no immunity to, causing large numbers to die (1). Local farmers have been displaced and forced to move to crowded cities, where they end up living in favelas (1).</td>
<td>6</td>
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<tr>
<td>3.</td>
<td>Marks may be lost for a generalised answer which does not refer to a specific city. If Glasgow chosen:- Pedestrianisation of areas in the city centre to create traffic-free areas, e.g., Buchanan Street (1). Park-and-ride schemes are used, where people park their car on the outskirts and travel into the city by train or bus, to encourage the use of public transport, e.g., Merriton, Chatelherault (1). One-way systems, e.g., George Square, improve the flow of traffic because vehicles do not need to slow down to pass each other nor look for other vehicles coming in the opposite direction (1). Parking restrictions and making parking more expensive discourages motorists from using their car in the city centre, making the streets wider allowing traffic to flow more easily (1). Multi-storey car parks hold large amounts of cars, reducing congestion on the streets (1). Dedicated bus lanes reduce travelling time, making public transport more efficient and attractive and reducing the volume of cars (1). Improvements in the road system, with new links created to bypass congested areas, removing unnecessary traffic from narrow roads (1).</td>
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Section 3: Global Issues

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<tbody>
<tr>
<td>1. River Basin Management</td>
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<td>(a)</td>
<td>The Missouri’s drainage basin has highly variable weather and rainfall patterns. Most of the drainage basin receives less than 250mm of rainfall per year, so it suffers from drought at certain times of the year, but some of the most western areas of the basin in the Rockies may receive up to 1000mm causing flooding (1). Most of the rainfall happens in winter but the intense heat of summer causes violent thunderstorms, again leading to overland flow and flooding (1). The river has many tributaries, causing river levels to rise dangerously especially with the spring snowmelt (1). The river carries a massive amount of sediment, which prevents a clear view of the bottom, in the past causing many ships to be wrecked (1). There is not a dependable flow to maintain a navigation channel year-round, which could hamper trade and tourism (1). The increasing population means an increasing demand for a water supply, so, managing the river ensures a constant supply of water for drinking and domestic use (1).</td>
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<tr>
<td>Question</td>
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<tr>
<td>(b)</td>
<td>For full marks both the people and the environment must be mentioned. If the Missouri chosen: Control of the river, through the construction of levees along the lower river and major tributaries, channelisation of floodplain tributaries, and an extensive reservoir system in the large tributary basins of the Platte, Kansas, and Osage rivers, stopped flooding in many areas, resulting in less people being displaced and less injuries/deaths (1). The six main dams and their reservoirs can store three years’ worth of rainfall, removing the threat of drought and thus ensuring a constant supply of water for domestic requirements and irrigation (1), meaning more food available for consumption and for sale which improves the health of the people and the economy of the country (1). Cheap supply of HEP encourages industry into the area, creating jobs and improving the standard of living in the area (1). The reservoirs encourage tourists into the area, improving the local economy, eg the Missouri reservoirs contribute around $100 million to the regional economy each year (1). Improved facilities like boat ramps and campgrounds were built, improving leisure facilities for locals as well as tourists (1). The reservoirs encourage new wildlife into the area such as waterfowl, a new water bird habitat and spawning areas for fish (1).</td>
<td>5</td>
</tr>
<tr>
<td>2. Development and Health</td>
<td>Primary health care (PHC) strategies have been introduced by many developing countries in an effort to improve the health of the population. In rural areas of China, the ‘barefoot doctors’ programme has been introduced. Barefoot doctors are local people who are given basic training so that they can attend to the health needs of their community, eg snake bites, improving general health (1). This means that medical aid is within easy reach of the community and this saves them travelling to the nearest hospital (1). It also takes the pressure off the large hospitals, allowing them to deal with more serious illnesses (1). The barefoot doctors are effective as they provide the hope of healthcare for people in more remote areas where budgets and manpower can be limited (1). Training costs are low, eg in India it costs $100 to train a health worker for a year (1). Although the barefoot doctors cannot carry out major procedures, they provide people with important information and services such as advice on birth control, vaccinations and basic hygiene which helps prevent the spread of disease, reduce the birth rates and infant mortality rates. This means that the government can spend more money on development (2). In some areas, doctors visit rural villages and treat the sick who are too ill to travel to the nearest hospital. They run clinics in the larger villages and take a mobile health van to the more remote villages. This means that the villagers receive vital healthcare which can reduce the death rate (1). Some PHC programmes provide villages with local dispensaries which improves the health of the people by giving them access to essential modern drugs and family planning (1). Some programmes also implement improvements to sanitation facilities and the provision of clean drinking water, reducing the cases of cholera and malaria and improving the health of the working population which allows them to provide for their families (1).</td>
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<tr>
<td>3. Global Climate Change</td>
<td>Extracting and burning fossil fuels such as coal or petroleum results in the release of carbon dioxide (CO₂) and other heat-trapping ‘greenhouse gases’ into the atmosphere (1). Growing populations and the consequent rise in the use of electrical gadgets increases the demand for electricity, thus increasing the amount of carbon dioxide released into the atmosphere (1). The number of private cars on the road, as well as an increase in the use of lorries to transport goods, eg food shopping online, has increased exhaust emissions entering the atmosphere (1). No-frills airlines like easyJet and Ryanair have made air travel much more accessible to large numbers, and a growing demand for products from all over the world has increased the use of aircraft, and thus the consumption of fossil fuels (1). Clearing forests releases large amounts of CO₂. Also, plants and trees use CO₂ to grow so deforestation means there are less trees to absorb the extra CO₂, meaning more CO₂ stays in the atmosphere, trapping more heat (2). The continually increasing world population means there is a greater demand for food, resulting in more cattle being farmed. Cows produce harmful gases such as methane which contribute to global warming (1).</td>
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<tr>
<td>(b)</td>
<td>Global warming is causing glaciers to melt, putting millions of people at risk from floods, eg the Fenlands of Eastern England and the Ganges Delta in Bangladesh (1). Many low-lying island nations are at risk of submergence from rising sea levels, eg the Kiribati islands (1), and saltwater intrusion affects the quality of water in wells, and floods taro patches and gardens affecting food supply (1). Warmer sea temperatures can affect sea life, eg Scotland’s hottest year on record was in 2003 and this rise in temperature killed hundreds of adult salmon as rivers became too warm for them to extract enough oxygen from the water (1). Warming sea temperatures force fish shoals to move to cooler waters, affecting catches and fishermen’s livelihoods (1). In the Sahel area of North Africa, rising temperatures may result in more droughts which means crops won’t grow and famines will become more frequent (1). In other areas like the UK, increased temperatures can result in some crops like potatoes failing but at the same time can encourage the growth of soft fruits that like warmer conditions (1).</td>
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</table>
4. Trade, Aid and Geopolitics

The aid may be subject to conditions imposed on the receiving country which ties them to the donor country, e.g. the receiving country is often required to use the aid to purchase goods and services from the donor country (1). Producing the goods improves the economy of the donor country but might mean that the receiving country could have bought the goods cheaper elsewhere (1). Developed countries may set up industry in the receiving country. Although these industries may provide employment, the profits from the goods produced may go back to the donor country instead of being spent on the necessary needs of the developing country (1). The goods produced may be cheap and the profits low, so the receiving country may not be able to invest in areas such as industry and agriculture (1). In Uganda only 18% of the contract value of World Bank-funded projects went to local firms. Firms from China and the UK won the bulk of large World Bank-funded contracts in Uganda. 32% and 19% respectively (1). Big development banks, including the World Bank, opt for international competitive bidding, increasing the chances that large firms from donor countries will win contracts (1). Two-thirds of formally untied aid contracts still go to firms from rich donor countries, while developing countries are squeezed out by powerful transnational companies (1). Aid may be given to benefit the donor country politically, or to strengthen a military ally, or to provide infrastructure needed by the donor for resource extraction from the recipient country to increase their profit (1). Donor countries give aid to make them look good (1). Companies from developing countries do not have the business knowledge, ability or contacts, therefore lose out on contracts to transnational companies who have business acumen and offices in key areas for the global aid industry such as Washington and Brussels (1).

5. Energy

Marks could be lost if answer does not include specific examples.

Hydro-electric energy involves generating electricity using the power of moving water. Therefore, hydro-electric plants need to be located in areas where there is a high average rainfall so that the reservoirs needed to store the water are always full (1). Electricity is generated by the force of the water turning turbines, so steep slopes, e.g. in mountain areas, are needed (1). Glaciated areas in Scotland with hanging valleys are suitable as they provide the drop necessary to turn the turbines to provide electricity (1). The rock needs to be impermeable to prevent loss of water through seepage (1). In the UK, however, most suitable sites are already used for hydro-electric power stations, so there is very little scope to increase the use of HEP in the future (1).

Solar power is suitable in areas where there are long hours of sunshine to power solar panels. This would be more suitable in areas like Mallorca than in Scotland where sunshine hours are more limited (1). Geothermal power is suitable in areas of volcanic activity like Iceland where the power from volcanoes is used to heat houses due to its location on a plate boundary (1). Recently Japan, which is one of world’s most seismically active nations, has been investing lots of capital in geothermal power and generates as much as 23 million kilowatts of energy which makes it less dependent on other nations for power (1).

Wind power is most efficient in areas with no barriers to the force of the wind, ensuring a continual supply of power to the turbines (1). However, wind power can be controversial as it causes visual pollution as well as disturbing local habitats (1). Wind power is dependent on the continual supply of wind so there is a difficulty in supplying continual energy on calm days as it’s difficult to store the energy produced (1).

The generation of electricity from wave power is currently under development and, since wave energy resource is distributed across the globe, wave energy offers many countries the benefit of security of supply (1).

Bio fuels can provide continuous energy as required by the burning of plant matter and it is affordable in developing countries (1).
### Question 1

**Sample Answer**

There would be a limited impact on the environment as the area is already industrial as the aerial photograph (diagram 2) shows. The new nuclear facility would be built alongside the present Sellafield so would blend in. There are few villages in the area so will not affect very many people. However there are many farms in the area for example Greenmoor Farm at 022053 and that would be lost as the new facility would be built on its site. This would result in less farmland to produce food as well as the farmer losing his livelihood. There is forestry at 026055 and hedgerows in the area which might be removed causing a loss of animal habitat (shown on diagram 2). Also since Moore House Farm is north east of the proposed site then the prevailing wind could blow particles over the farm contaminating his crops and animals therefore not in keeping with the brief for this project. The area is close to a National Park boundary where the landscape is supposed to be protected. The new facility could affect the quality of the park’s environment.

Local people are up in arms about the risks attached to the present decommissioned power station. The brief says it should have a minimal impact on the people but as the Diagram 4 shows this is not the case as some health problem seems to be linked to the possible effects of radioactivity from the plant. The local newspaper says that radioactive particles have been found on the surrounding beaches causing concerns for the health of the locals as well as polluting the environment. However diagram 3 refutes these claims as Sellafield has won eight safety awards suggesting there is no problem with the risk of radioactivity affecting people and the environment.

The brief calls for good transport routes. The area has relatively good access with a train station a few kilometres away at Seascale at grid reference 037011. There is also good road access via the A595 with a minor road connected directly to the power station. Although there are no large towns close by workers can be found in the surrounding villages of Egremont, Gosforth and Seascale.

It can be seen from the OS map that the contour lines on the map are quite far apart showing the land is relatively flat. This meets the brief as this flat land will be easy to build on. The area suggested is relatively empty so there is room to expand if necessary.

In my opinion there are more disadvantages than advantages. This site does meet the conditions of the brief as far suitability of flat land to build on, access into and out of the area via road and rail and the availability of a nearby workforce. However I think the effect on the local people, environment and landscape with loss of habitat, visual and air pollution and the possible effects on health outweighs the advantages.

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