

A23: Decision Making in Geography

Geographical Association
Tuesday 18th February 2025
Dr. Mark Wood



Specification

- 1 hour 30 minutes
- 12% of total A Level

In this unit, students develop decision-making skills in a real-world scenario. They identify and analyse appropriate material, examine conflicting values and make and justify recommendations.

Content	Learning Outcomes
Decision making in geography	<p>Students should be able to:</p> <ul style="list-style-type: none">(i) prepare for a compulsory decision-making exercise that takes the form of a case study;(ii) adopt and maintain a particular role;(iii) review and analyse a variety of resources, presented as a resource booklet accompanying the written examination, which may include:<ul style="list-style-type: none">– maps;– statistics or data;– reports;– infographics;– diagrams; and/or– photographs;(iv) process and present quantitative data supplied using appropriate techniques;(v) interpret and evaluate the information provided;(vi) examine conflicting values that may be apparent in the case study;(vii) consider alternative choices; and(viii) make and justify recommendations on the basis of greater overall benefits.

Current Specification Case Studies

- **2018** – Aquaculture, Galway Bay, Ireland
- **2019** – Carmichael Mine, Australia
- **2021 (AR)** – Tidal Lagoon, Swansea Bay
- **2022** – Pebble Mine, Alaska
- **2023** – Afforestation in Leitrim, Ireland
- **2024** – Nijgadh Airport, Nepal

You need to **practise** completing DMEs in timed conditions.

Format [2]

14141

You must adopt the role of Mr Tenzing Norgay, an independent consultant employed by the Nepalese Government, who is to recommend whether or not an airport should be built at Nijgadh.

	MARKS	
Format	2	Each of the three sections must be clearly set out using the headings and sub-headings provided.
Role	2	You must adopt and maintain the stated role.
Graph	8	Draw a graph using all of the data from Table 1 (found in Text A) and incorporate it into the report at an appropriate place.

3

YOUR REPORT MUST BE STRUCTURED AS BELOW		MARKS	GUIDANCE TO CANDIDATES
Heading [1]	Sub-heading [1]		
A. Introduction		10	A. Briefly describe the proposal and discuss the need for it.
B. The likely impact on:	(i) Employment and the economy	14	B. (i) Discuss the possible beneficial effects of the proposal on employment and the economy and the counterarguments. (ii) Discuss the potential negative impacts of the proposal on the environment and people and the counterarguments.
	(ii) The environment and people	14	
C. Conclusion		10	C. State clearly your decision and justify it on the basis of the greater overall benefits.

Format [2]

Do not amend the titles/subtitles provided. **You must use them exactly as they are provided.**

Each heading and subheading should be used **only once.**

Take a **new line** for each heading and subheading.

Candidate 1

- Introduction
- Likely impact on employment and economy
- Likely Impact on Environment
- Decision

YOUR REPORT MUST BE STRUCTURED AS BELOW	
Heading	Sub-heading
A. Introduction	
B. The likely impact on:	(i) Employment and the economy (ii) The environment and people
C. Conclusion	

[0/2]

Candidate 2

- A. Introduction
- B. The Likely impact on:
 - i) Employment and the economy.
 - ii) The environment and people
- C. ~~Decision~~ Conclusion

YOUR REPORT MUST BE STRUCTURED AS BELOW	
Heading	Sub-heading
A. Introduction	
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C. Conclusion	

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Role [2]

You must **adopt** [1] and **maintain** [1] the role given.

Typically, the role is adopted in the **Introduction**.

The role can be maintained in any other section of the report. Typically, the role is maintained in the **Decision/Conclusion**.

Write your report in the first person and do not fear personal pronouns (e.g. I and we).

Candidate 1

1411

You must adopt the role of Mr Tenzing Norgay, an independent consultant employed by the Nepalese Government, who is to recommend whether or not an airport should be built at Nijgadh.

A. Introduction

I am Mr Tenzing Norgay and as an independent consultant employed by the Nepalese Government it is my responsibility to recommend whether or not the airport at Nijgadh should proceed.

C. Conclusion

I, Mr Tenzing Norgay, an independent consultant employed by the Nepalese Government, have decided that I do not recommend building this airport.

[2/2]

Candidate 2

1411

You must adopt the role of Mr Tenzing Norgay, an independent consultant employed by the Nepalese Government, who is to recommend whether or not an airport should be built at Nijgadh.

A. Introduction

As Mr Tenzing Norgay I will weigh up potential effects on employment, the economy and the environment of a new airport being built at Nijgadh, Nepal.

B. The Likely Impact on:

(i) Employment and the economy

As a consultant to the Nepalese govt. it is important to analyse the impact of Nijgadh airport on employment and the economy, both locally and nationally.

[2/2]

Graph [8]

14141

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Graph [8]

- **Reference [1]:** "As can be seen in my graph..."
- **Technique [1]:** The technique must be appropriate.
- **Accuracy [3]:** All data must be accurately plotted.
- **Conventions [3]:**
 - Title must refer to **both** variables.
 - Both axes labelled (with **units**).
 - Accurate key (if required).
 - **Consistent intervals** on the x- and y-axis.
 - All values encompassed by the axes.

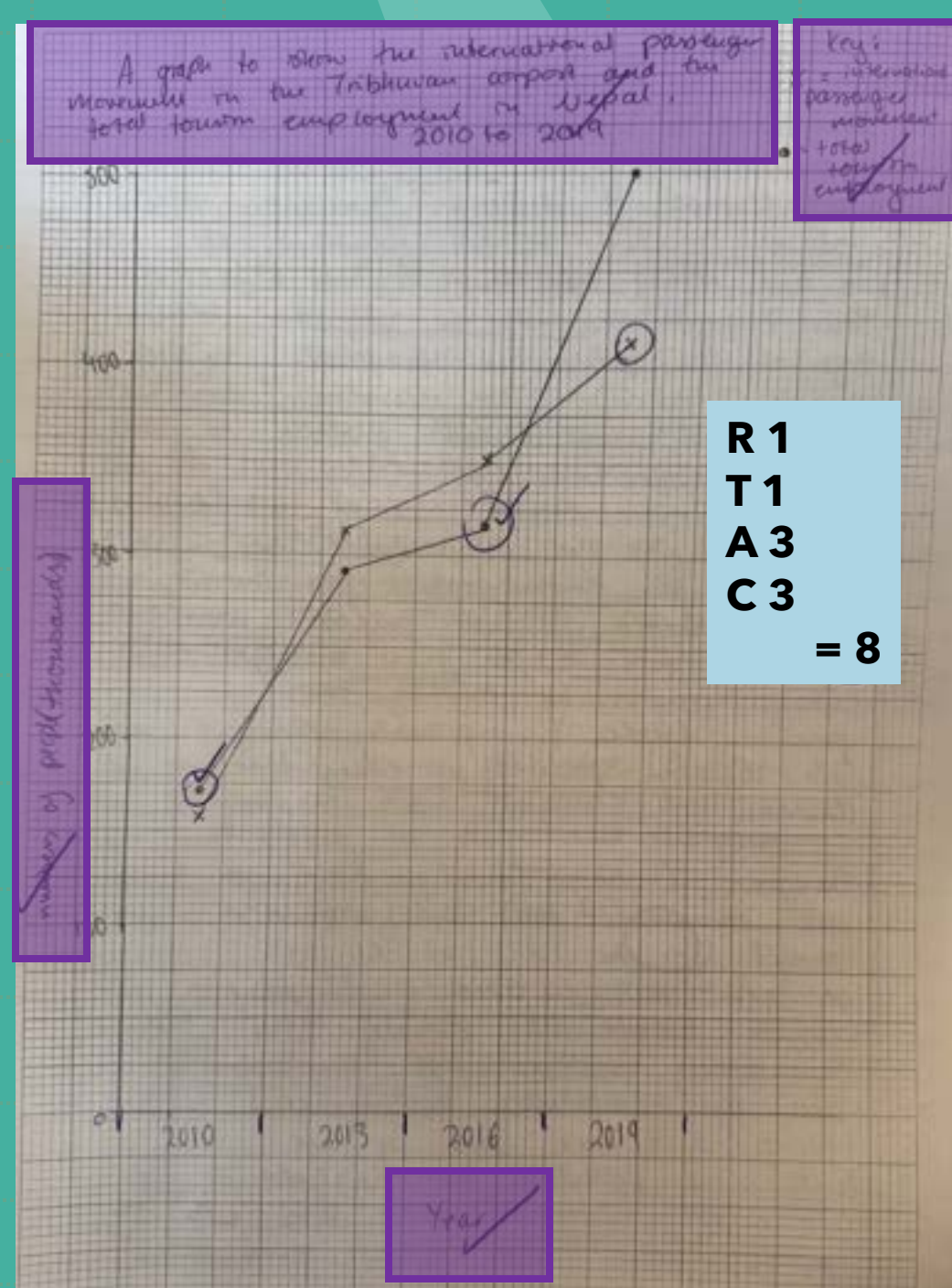
Graph

Table 1: International passenger movement in Tribhuvan International Airport, Nepal, and total tourism employment in Nepal, 2010–2019 (thousands)

Year	International passenger movement in Tribhuvan International Airport (thousands)	Total tourism employment in Nepal (thousands)
2010	158	171
2013	314	286
2016	351	317
2019	414	500

Candidate 1

- **Reference [1]:** "This is clear, see graph, as in 2019 the total tourism employment was..."
- **Technique [1]:** Line graph is appropriate.
- **Accuracy [3]**
- **Conventions [3]**



Candidate 2

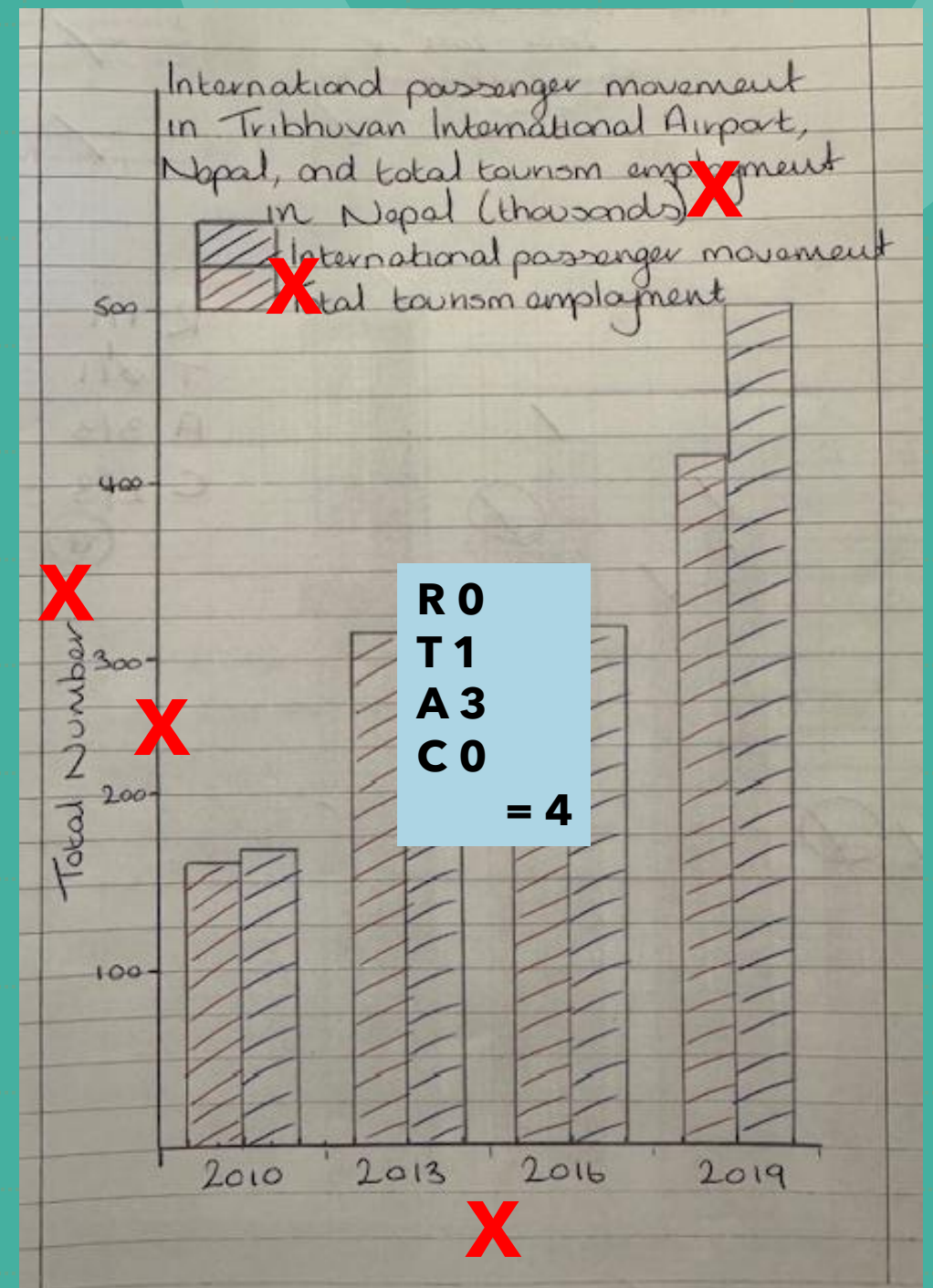
Reference in report reads:

"As can be seen in Table 1, there has been an increase in international tourism and tourism employment between 2010 and 2019."

Candidate has achieved 3/3 for Accuracy.

Table 1: International passenger movement in Tribhuvan International Airport, Nepal, and total tourism employment in Nepal, 2010–2019 (thousands)

Year	International passenger movement in Tribhuvan International Airport (thousands)	Total tourism employment in Nepal (thousands)
2010	158	171
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2019	414	500



Graph: Appropriate Technique?

Table 1: Species of trees (%) in Leitrim and across all of the Republic of Ireland, 2017

		Leitrim %	Republic of Ireland %
Conifers	Sitka Spruce	61	40
	Other spruce, pine and larch	9	15
Broadleaved trees	Oak	1	2
	Beech, ash and sycamore	2	11
	Other broadleaved trees	27	32

Source: adapted from Ireland's National Forest Inventory, 2017

Bar Graph.

**Ideally a
compound
bar graph.**

Graph: Appropriate Technique?

Table 1: Numbers of sockeye salmon returning to Bristol Bay and the numbers harvested

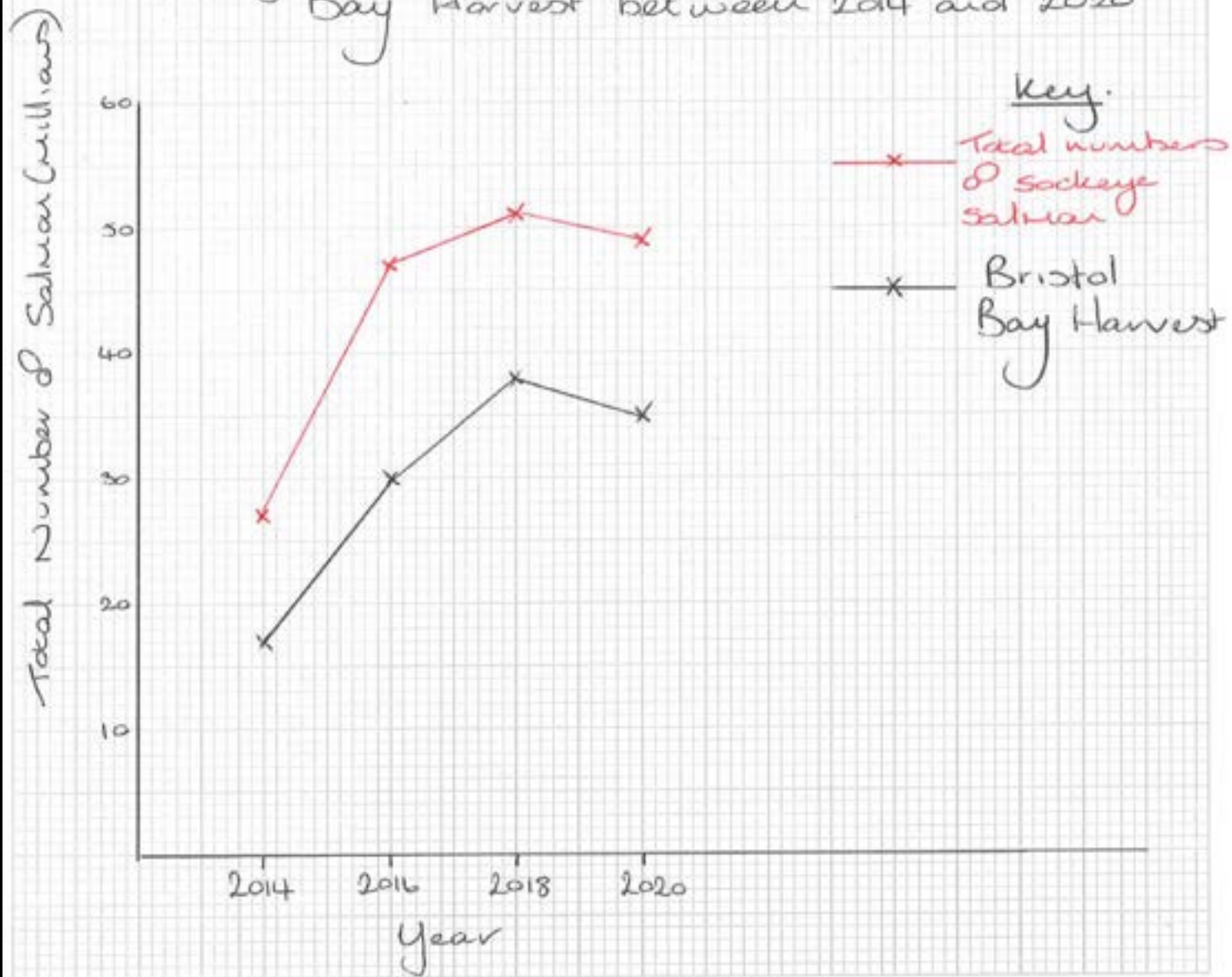
	Total numbers of sockeye salmon returning (millions)	Bristol Bay Harvest (millions)
2014	27	17
2016	47	30
2018	51	38
2020	49	35

Source: Alaska Department of Fish and Game

Line Graph.

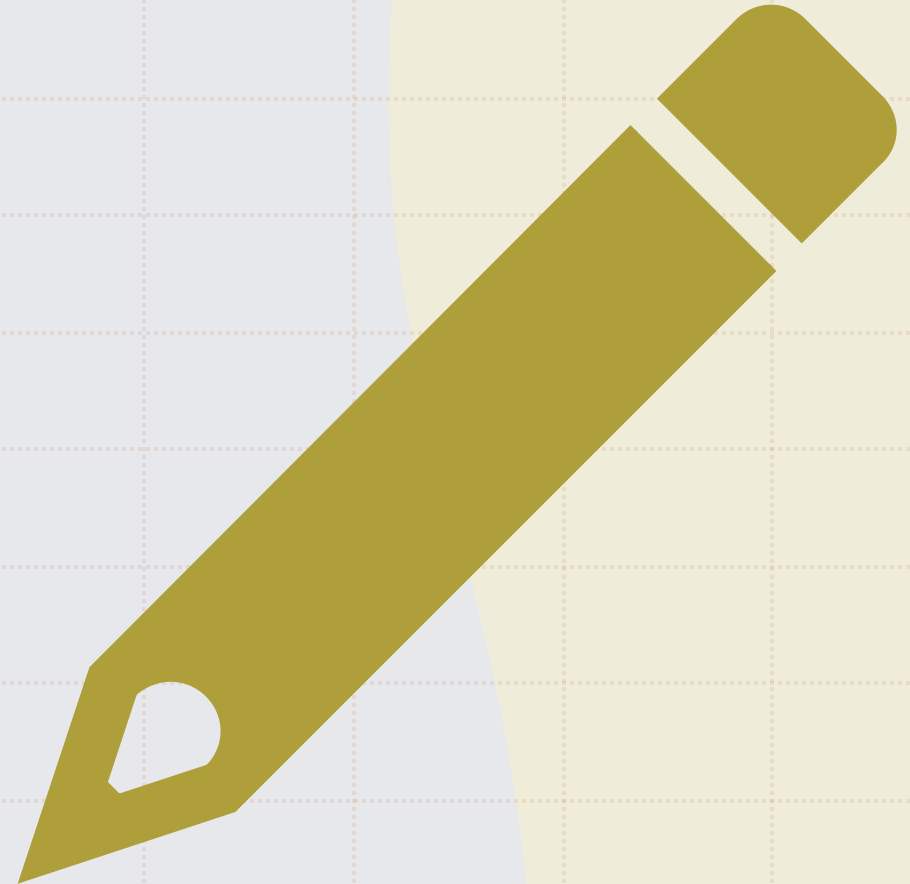
Bar graph is also acceptable.

Line graphs showing the total numbers of Sockeye salmon returning and the Bristol Bay Harvest between 2014 and 2020



Writing the Report

"You are strongly recommended to spend 30 minutes reading the question and selecting appropriate information before attempting to write your report."



The Value of Non-Text Resources



Higher marks are reserved for those who can integrate non-text resources (e.g. photographs, maps, infographics) into their response. Where possible, you should make **conspicuous references** to the resources: "I can see in **Resource 1A** that..." / "After reviewing **Resource 2B** I can see that..."



Quote figures from any graphs provided in the Resource booklet.



There is no need to make conspicuous references to the Text resources. Examiners know you are using the text already.



Quotes can be very valuable, but you do not need to use the full quotation. Use the name of the person and extract a small, valuable portion of it.

You must adopt the role of the Geographer, Dr Rosa McElroy, Advisor to the US Government, who is to consider the mine proposal and recommend whether or not it should proceed.

	MARKS	
Format	2	Each of the three sections must be clearly set out using the headings and sub-headings provided.
Role	2	You must adopt and maintain the stated role.
Graph	8	Draw a graph using all of the data from Table 1 (found in Text B) and incorporate it into the report at an appropriate place.

YOUR REPORT MUST BE STRUCTURED AS BELOW		MARKS	GUIDANCE TO CANDIDATES
Heading	Sub-heading		
A. Introduction		10	A. Outline the need for the project and briefly describe it.
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Introduction

INTRODUCTION

Alaska is a state in the USA with vast areas of remote and largely untouched wilderness. Just north of Lake Iliamna and close to Bristol Bay is an area of over 100 000 square kilometres of wild tundra and wetlands under which minerals were discovered in 1988. Virtually inaccessible, except by air, this habitat is almost entirely unchanged by people. There is a wide variety of wildlife including bald eagles and bears and also the world's most productive run of salmon, when between 40 and 60 million fish return each year to the rivers in which they were born, to mate, lay eggs and start the cycle again.

There is a growing demand for minerals in the USA and across the world. This includes the copper, gold and molybdenum found in this deposit which some suggest will be worth \$400 billion. The demand for copper is predicted to rise by 350% by 2050, but current reserves will run out around 2040. Gold is required for electronics and electrical components and molybdenum has a wide range of important industrial uses. The USA currently imports 68% of the molybdenum that it requires.

A mine is proposed to extract these valuable minerals. Resources 1A and 1B show the proposal being considered here. Because the area lacks suitable infrastructure to transport the ore, the following will need to be developed:

- a private road from the mine to Lake Iliamna;
- an icebreaking ferry crossing the lake;
- another road on the south side of the lake; and
- a new port constructed at Amakdedori.

The new roads will each support up to 35 round trip truck journeys each day. A gas pipeline is proposed, which will run from close to Anchor Point across the Cook Inlet to Amakdedori and then, following the line of the new roads and under the lake, to the mine. This will provide a long-term stable supply of natural gas to meet the energy needs of the project.

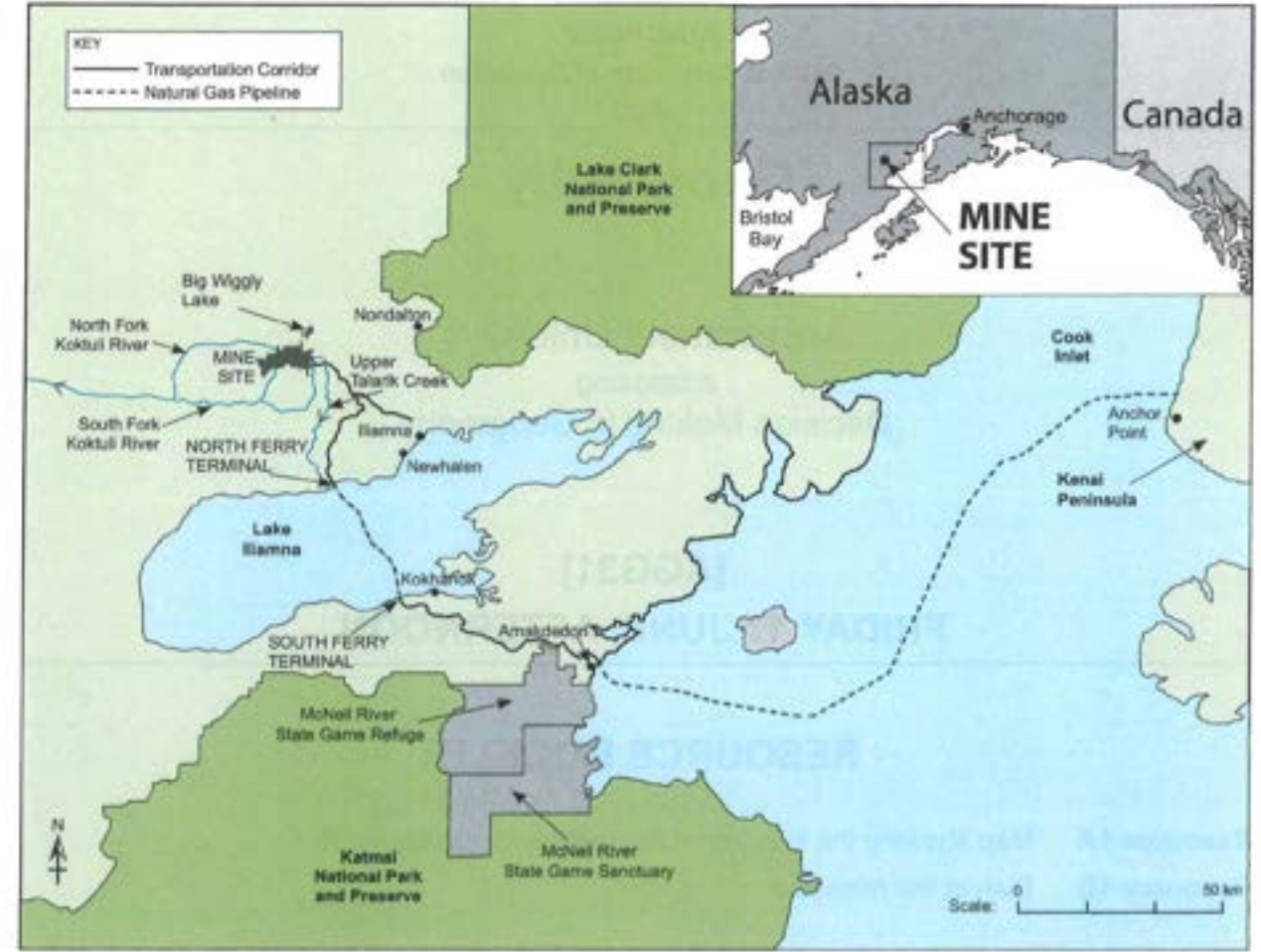
The fishery in Bristol Bay supplies half of all sockeye salmon traded around the world, which makes this a \$1.5 billion sustainable commercial industry. The environment supports Aleut and other indigenous peoples who are largely subsistence hunters and gatherers. Inhabiting this area for 10 000 years, these people live off the land by gathering edible plants and berries for food, and hunting moose and caribou and catching fish for food and clothing, shelter and art, in a sustainable fashion. Although there have been influences from fur traders, missionaries and commercial fishermen, these peoples continue to observe the traditions and languages of their ancestors. Their most important subsistence activity centres on salmon, making this one of the few remaining salmon-based cultures on Earth.

Source: Principal Examiner

Describe
Needs

RESOURCE 1A

MAP SHOWING THE LOCATION OF THE PROPOSED DEVELOPMENT

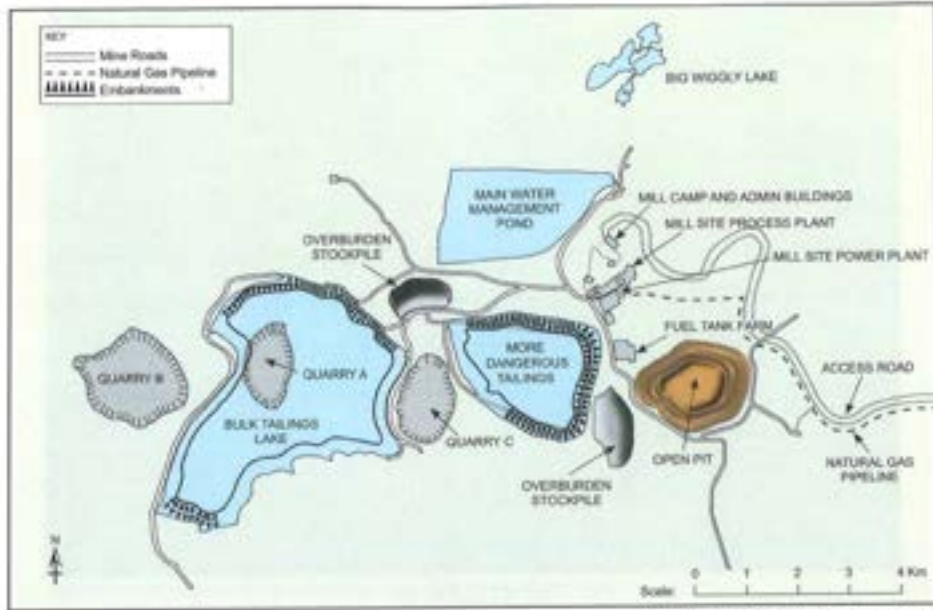


Source: Map redrawn from a range of widely available sources

Describe it.

Introduction

RESOURCE 1B
PLAN OF THE MINE SITE



Source: Adapted from The Pebble Partnership

Note: The quarries, starting with Quarry A, will be used as sources for rock to build the embankments around the tailings lakes.

Describe

Describe

Need

RESOURCE 3A
PEBBLE MINE INFOGRAPHIC

THE PEBBLE MINE

RISKS TO SALMON, COMMUNITIES AND JOBS
CONFIRMED IN RECENTLY RELEASED MINE PLAN

Recently, the Pebble Partnership submitted its federal permit application to develop a massive open pit mine at the headwaters of Bristol Bay, Alaska - home to world-class salmon rivers. A review of their plans confirms that:

- The Pebble Mine would irrevocably damage Bristol Bay's salmon runs, clean water, and wild landscape.
- The current application is for phase one only and will require wastewater treatment forever. No mine of this size and type has operated without impacts to ground and surface water in North America.

Pebble Deposit = 7.5 billion tonnes of ore
Current Plan = 4.1 billion tonnes of ore

The company has not relinquished claims on hundreds of square kilometres of state lands adjacent to the proposed mine site. The Pebble Mine will very likely expand over time.

THE MINE PROPOSAL



An open pit mine over 500m deep and over 1.6 km wide and long in the headwaters of the largest sockeye salmon run in the world

Approximate area of the mine and associated infrastructure
32 km² footprint

14 km² of wetlands, ponds and lakes destroyed

160 kms of private road

to haul minerals and mine waste which would cross Lake Ilamna and salmon streams (200+ times), including the famed Upper Talark Creek.



A 300 km pipeline from a new natural gas facility on the Kenai Peninsula

A new permanent deep-water port in Cook Inlet

Billions of litres of wastewater discharged each year, including into the headwaters of the two biggest river systems in the region



More than 99% of all comments—2.5 million+ in total—were submitted to the EPA in opposition to the mine.



Save Bristol Bay

*EPA = Environmental Protection Agency

Source: Adapted from Save Bristol Bay (<http://www.savebristolbay.org/bloghost/2018/2/21/pebbles-mining-plan-is-disastrous-for-bristol-bay-salmon/>)

A. Introduction

My name is Dr. Rosa McElroy, Advisor to the US Government, and I am going to consider the Pebble Mine proposal and decide whether it should proceed or not.

Using Resource 1A I can see that the proposed mine is located in Southern Alaska, north of Lake Iliamna. The Pebble Mine would extract valuable copper, gold and molybdenum. Some estimates suggest these minerals have a value of \$400 billion. Resource 3B shows that Pebble West deposits (4.1 billion tonnes) are found at a depth of 300m below sea level. At Pebble East, 3.4 billion tonnes are found at a depth of 1050m below sea level. More than just the mine will be developed. Over 160 km of private road and 300 km of natural gas pipeline will connect the mine area to Lake Iliamna, the South Ferry Terminal, a new port at Amakdedovi and, finally, to Anchor Point at the Cook Inlet. Mining will continue for 20 years and the development will cover 32 km².

There is a need for these minerals in the USA and across the world. Demand for copper is said to grow by

350% over the next 30 years, with current reserves being used up by 2040. Gold is required for use in the manufacturing of electrical goods and molybdenum is used across many industries. The USA currently imports 68% of its molybdenum, so a source within the country's borders would be very attractive to them. There is also the suggestion that this area of Alaska is in need of development. The nearest three settlements have populations under 160 people. The mines could encourage in-migration and economic growth.

- Paragraphs.
- Clear description.
- Clear need.
- Balanced section.
- Factually detailed.
- Clear non-text references.

The Likely Impact on:

12973

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The Likely Impact on:

- Normally **two** sections to complete.
- Within each section, you should include 3-4 arguments for each side of the debate.
- Adopt a logical structure and present each individual argument in its own paragraph.
- **People/Employment/Economy**: address the possible benefits and the counterarguments in your report.
- **The environment**: address the potential damage and the counterarguments in your report. Remember, the counterarguments here aren't necessarily positive impacts, they could be the strategies being put in place to reduce the impacts of the development.
- Make sure you complete each section in the order given. Do not address the counterarguments first – **this makes no sense**.
- Make as much use of the additional resources where possible. Examiners are easily impressed by those candidates who can integrate references to photographs and maps within their reports.
- Include as much depth and detail as possible, without resorting to verbatim quoting from resources.

The Likely Impact on:

Environment
Emp/Eco

TEXT B

ARGUMENTS AGAINST THE PROPOSAL

This proposed massive open pit, Pebble Mine, will pose too much of a risk to Bristol Bay and its rich, sustainable salmon stocks (Table 1). Between 2013 and 2017, Bristol Bay's commercial salmon fishery contributed on average \$14.7 million in revenue to the local government each year. The industry employs almost 1800 resident workers all year round, but 8900 workers in July when the salmon season is at its height. In total, the workers' annual income across the region is \$220 million. In the Bristol Bay region, about one third of all working-age people are employed directly in the fishing industry. The income for the state of Alaska from this fishery is \$573 million per year. The commercial salmon fishery at Bristol Bay has been thriving for 135 years because of sound management and rigorous regulations. If Pebble Mine is allowed, the image of Bristol Bay Sockeye Salmon and the entire Alaskan Seafood brand will be tarnished and salmon sales will decline.

Table 1: Numbers of sockeye salmon returning to Bristol Bay and the numbers harvested

	Total numbers of sockeye salmon returning (millions)	Bristol Bay Harvest (millions)
2014	27	17
2016	47	30
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2020	49	35

Source: Alaska Department of Fish and Game

There is a threat to local people whose way of life revolves around the salmon and other creatures which depend upon them. The proposed mine places in jeopardy cultural traditions dating back 10 000 years. Most of the people of Bristol Bay are indigenous Alaskans whose cultures are salmon-based; salmon for them have a significance which goes beyond food and wealth. Six indigenous Alaskan tribes in Bristol Bay have petitioned the U.S. Government for protection of the rivers and streams. Other groups dependent on the fishery have joined them, including more Bristol Bay tribes, commercial and recreational fishermen, processors of seafood and supermarket owners.

Work associated with the infrastructure around the mine will also have an impact. The Amakdedori port development will damage a currently unspoiled coastline on Cook Inlet. The neighbouring Game Sanctuary and refuges are among the most important protected areas for brown bear (Resource 2C) on the planet and home to the largest annual congregation of bears ever witnessed. The road and port could deter bears moving to and from the National Reserves. Any threats to brown bears do not just diminish the environment: bear tourism is big business. In 2017, bear viewing service providers reported \$34.5 million of sales, paid around \$10 million in direct wages and employed 371 people, with another 119 indirect jobs.

The company behind Pebble Mine is trying to persuade locals and the government that this will be a 'small' mine. However, as the ore at Pebble is extremely low-grade, massive open pits will be required. Although the footprint has been reduced to gain permission to mine, the pit will be over 1.6 kms long and wide, directly destroying 131 kms of salmon streams, and impacting on a much greater area around the site.

It is repeatedly stated that mining will only last for 20 years, but the company themselves have let slip that 20 years will not provide sufficient time to extract the majority of the deposit. Mining could extend into Pebble East deposit and continue for generations (Resource 3B).

Extracting metal ores and separating the minerals from the rock creates waste sludge called tailings, which can be very dangerous to the environment. Pebble Mine will store their tailings in massive ponds close to the mine and the processing works (Resource 1B). Even if the mine only operates for 20 years, when it closes, the 1 billion tonnes of tailings will be dumped into the empty pit, requiring constant monitoring and maintenance, as it will remain potentially dangerous far into the future. Any accidental discharge from the most dangerous tailings ponds will significantly damage salmon habitats. Open pit mines such as this one, even within the United States, have a poor record with regard to containing their tailings. While a major earthquake is unlikely, it is possible. The company cannot foresee what natural events might threaten the stored tailings over the next several thousand years. If mining were to continue beyond 20 years, potential threats from the tailings would escalate further.

It would not require a massive failure of the dams holding back the tailing ponds to disrupt the salmon stocks of Bristol Bay. Recent research shows that even low concentrations of dissolved copper leaching from the tailings could interfere with the ability of salmon to navigate to the rivers in which they spawn, or to avoid predators.

Source: Principal Examiner

The Likely Impact on:

EMP/ECO
ENVT

TEXT C

ARGUMENTS IN FAVOUR OF THE PROPOSAL

This mine is proposed for Lake and Peninsula Borough, an area with 1600 people with low incomes, poor infrastructure and high out-migration. Poverty levels in this borough (16.1%) are higher than for Alaska as a whole (9.1%). The population of Lake and Peninsula Borough fell by over 20% between 2000 and 2010. School enrolments also fell from 500 to 344 in the same period.

The Pebble Mine should bring significant economic development to the whole of Southwest Alaska through the creation of high-wage jobs and other opportunities for local businesses. The project will provide 2000 direct jobs during its four-year construction phase and employ 850 during its operations phase, which will last 20 years. The average mining wage is \$100 000 per year. As a result of the scale of the project, it is anticipated that up to 50% of the labour during construction will have to be from outside Alaska, bringing benefits to the rest of the USA. It is estimated that during the operational period, 250 employees would come from surrounding communities, with the remainder flown in from other parts of Alaska. Communities near the mine site and ferry/port terminals will benefit from higher employment rates lasting over the long-term life of the project.

The economic benefits are considerable:

During construction of the mine, each year Alaska will receive:

- \$27 million from tax revenue.

Once operating, each year Alaska will receive:

- \$69 million of additional taxes (estimated)
- \$44 million for mining licences.
- \$21 million from a royalty of 3% for all the minerals produced.

Lake and Peninsula Borough's 1600 people will get \$420 million over 20 years.

We are aware of the potential of the mine to damage culturally sensitive areas such as archaeological sites, historic villages and cemeteries. However, great care will be taken to ensure that any such sites are identified and measures will be taken to mitigate adverse effects.

The company is very aware of the importance of the environment for the local people who live off the land, and for the fishing industry and tourism. While water will be required to process the ore and separate the minerals from the waste rock, the mine would be designed to have no discharge of untreated water.

Surface water will have to be diverted and collected, and groundwater stored, in preparation for mining activities. This will have an impact on the watershed of North Fork Kottuli (NFK), South Fork Kottuli (SFK) – which flow into Bristol Bay – and possibly Upper Talarik (UT) – which flows into Lake Iliamna and then into Bristol Bay (Resource 1A). The impact on average monthly flow in the rivers would reduce, however, once the mine is operational. The one exception is a tributary of the NFK which would be removed during construction and will not be replaced. When compared to the total length of the three tributaries associated with the mine site, the loss of that tributary would represent only 3% of the spawning and rearing habitat for salmon. In the context of 16 000 kilometres of rivers and streams in the entire Bristol Bay river system, the loss of one tributary reduces stream habitats in the area by a mere 0.08%.

We accept that the alteration of the rivers and streams will have some impact on salmon spawning areas and other fish species. While some of the sockeye salmon spawning in the NFK is upstream around Big Wiggly Lake, the main areas are in the lower 16 kilometres which are downstream of the mine and will remain accessible to the salmon as they enter the river system. While 23% of the NFK basin area and 24 kilometres of the main channel are upstream of the mine site, and migratory salmon cannot reach them, non-migratory fish may still be able to breed in those waters. After careful water management, treated water released from the mine will account for only 0.01% of that which flows into Bristol Bay.

We will take great care to store tailings secured in a lined area retained behind a sequence of three dams. Seismic activity near the deposit is extremely low and no substantial seismicity has occurred for 11 000 years. Nonetheless, we are going to great lengths to protect against earthquakes. After the mine has closed any potentially dangerous tailings will be moved to the open pit (Resource 1A Quarry A), which means that the tailings pond for that waste will no longer be needed. The open pit would fill with water over time and, after that, excess water would be treated, optimised for fish, and discharged into the local river systems. This arrangement presents no failure risk and no threat to downstream habitats. Spill risk will be restricted to the operational phase. Should a spill occur, any metals and acids in the tailings not recovered would be heavily diluted by rain and surface water, and are unlikely to have any measurable effects.

Source: Principal Examiner

RESOURCE 2A
ENVIRONMENT OF THE AREA



Source: <http://images.huffingtonpost.com/2015-01-04-1451940982-7816813-705609.jpg>

RESOURCE 2B
ALEUT WOMAN DRYING SALMON



Source: <http://www.travelalaska.com/~media/images/TravelAlaskaImageGallery/inspit.jpg?w=1000>

RESOURCE 2C
BROWN BEAR IN ALASKA



Source: <http://animal.memcree.com/Arch/OLD-31112851044.jpg>

RESOURCE 2D
SOCKEYE SALMON IN ALASKA RETURNING TO SPAWN IN THE RIVERS



Source: <http://farheyguyphotography.com/wp-content/uploads/2013/12/SockeyeSalmonWashagatRiverBristolBayAlaska.jpg>

RESOURCE 2E

KENNECOTT COPPER MINE, ONE THIRD OF THE SIZE OF THE PROPOSED PEBBLE MINE



Source: <http://fishermenforbristolbay.org/wp-content/uploads/2011/08/Kennecott-2.jpg>

Question Number	Answer	Examiner's Use Only	Remark Use Only
B	<u>The Likely Impact on:</u>		
(i)	<u>Employment and the Economy</u>		
+1	According to a website for potential investors, Pebble Mine is "the biggest undeveloped gold and copper deposit in the world." The irony is that the area in question, the Lake and Peninsula Borough, has a low population of under 1600 people, has seen a 20% reduction in population since 2010, has 16.1% of people living in poverty and has seen school enrollment decline from 500 to 344. Clearly, investment in the mine could ensure the survival of these communities and increase economic activity.	Quote	
+2	As one resident puts it, "there are no other job opportunities, absolutely none" in this area. If granted approval, the mine and its associated infrastructure would create 2000 jobs in construction and employ 850 once in operation and for a 20 year period. A significant proportion of these jobs will be awarded to people living in Alaska - 1000 in construction and 250 in operations. In-migration of employees will help boost the economy locally and nationally, too.	Quote	

Question Number	Answer	Examiner's Use Only	Remark Use Only
+3	Incomes will be significant, too. Average mining wages are \$100,000 per year. During construction, the State of Alaska will benefit from \$27 million in tax and, once in operation, there will be a further \$69m in extra tax, \$44m from licenses and \$25m from mineral sales. The people of the borough could benefit from \$420m over 20 years.		
-1	Those who oppose the development point out that there will be a devastating impact on the fishing industry. Commercial salmon fishing in the Bristol Bay area contributed \$14.7m to local government each year between 2013 and 2017. The industry is also a major employer, with 11600 resident workers and 8900 during peak seasons. As shown by my graph, 38 million salmon were harvested in 2018. Any impact on salmon stocks is likely to damage 33% of economically active employed directly by fishing and the \$573m per year made by Alaska.		Graph
-2	Tourism could also be negatively affected by the development. Bear Tourism, for example, generated \$34.5m in sales, paid \$10m in wages and employed 371 people directly in 2017. Perhaps the scale of this development and its associated infrastructure has the potential to disrupt this important economic activity.		

(ii) The Environment

- 1 Opponents of the development are keen to stress the potential environmental impact. There are doubts regarding the suggested 20-year lifespan, with many indicating it is unlikely all extractions will occur during this time. This will only extend the footprint of this mine for years to come.
- 2 Despite being advertised as a "small mine", the 32 km² area being developed will threaten the ecologically important wetland habitats shown in Resource 2A and the habitats of brown bears, most notably in the Game Sanctuary area.
- 3 The pit is also said to directly destroy 131 km of salmon streams. The 160 km of new roads would also cross Lake Hiamna and salmon streams over 200 times. These developments could threaten salmon ability to migrate, breed and lay eggs in gravels.
- 4 The waste sludge from mining are called tailings and these can be very damaging to river water and salmon. Initially, the tailings will be stored in dams. Eventually, they will be moved to the empty pit. However, these will need to be monitored long after the mine has closed. Save Bristol Bay (Resource 3A) note that

Mines of this scale will always have a negative impact on ground and surface water. An accidental spill would be detrimental to river ecosystems and pose a threat to salmon. Given that this region experiences earthquakes, this could be a devastating environmental impact.

-5 Finally, there is the threat posed by copper, which is known to affect salmon navigation and spawning.

+1 The mining company. I have been told, will endeavour to minimise these environmental impacts. Fully aware of the importance of this environment to indigenous peoples, all water released by the mine will be treated first. Any treated water will account for 0.01% of water flowing to Bristol Bay. The company believes, therefore, that the risk is very low.

+2 There is a need to divert water before mining begins and this will impact on river flows in North Fork Koktevi, South Fork Koktevi and Upper Talarik rivers. However, once mining begins only one tributary of the North Fork Koktevi will be lost. This represents only 3% of spawning and rearing habitats for salmon on the Bristol. Given that there are 16000 km of streams, the loss of one tributary is minor.

+3 While salmon will be unable to reach spawning areas in Big Wiggy Lake, they can still access 16 km of North Fork Koktevi.

+4 Tailings will be stored securely. If there is a spill during the operation of the mine, contaminants would be diluted, thus minimising risk. There has also been no significant earthquake activity for 11,000 years. Despite this, the tailings would still be protected from earthquake activity.

Conclusion/Decision

12973

You must adopt the role of the Geographer, Dr Rosa McElroy, Advisor to the US Government, who is to consider the mine proposal and recommend whether or not it should proceed.

	MARKS	
Format	2	Each of the three sections must be clearly set out using the headings and sub-headings provided.
Role	2	You must adopt and maintain the stated role.
Graph	8	Draw a graph using all of the data from Table 1 (found in Text B) and incorporate it into the report at an appropriate place.

3

YOUR REPORT MUST BE STRUCTURED AS BELOW		MARKS	GUIDANCE TO CANDIDATES
Heading	Sub-heading		
A. Introduction		10	A. Outline the need for the project and briefly describe it .
B. The likely impact on:	(i) Employment and the economy	14	B. (i) Discuss the possible beneficial effects of the proposed development on employment and the economy and the counterarguments . (ii) Discuss the potential negative impacts of the proposed development on the environment and the counterarguments .
	(ii) The environment	14	
C. Conclusion		10	C. State clearly your decision and justify it on the basis of the greater overall benefits.

Chief Examiner Comment

It is pleasing to report that there was something of a balance between those candidates who decided to approve the construction of Nijgadh Airport and those who chose to reject it. Candidates who scored well usually stated their decision clearly at the beginning of the conclusion and then pitched the relative benefits to employment and the economy from Part B(i) against the apparent damage to the environment and people presented in Part B(ii). That is, those who supported the development took time to dismiss environmental concerns in favour of securing economic development, while those who rejected the proposal dismissed potential economic gains in favour of preserving the unique environment, its wildlife and its people. Such approaches to Section C allowed candidates to move beyond writing an extended summary of position and a simple retelling of the arguments already outlined in Parts B(i) or B(ii). Better responses, too, made use of a range of additional resource materials, with many incorporating snippets of quotations presented in Text D and/or making reference to non-text resources. They were rewarded for their efforts. Unfortunately, such approaches to Section C were seen on rare occasions only. Too many candidates opted for a summary of position and simply outlined key arguments to support their case. Moreover, despite ten marks being available in the section, conclusions drawn were often cursory in nature, lacked the required levels of specific detail and development required, and had few lines of thought. Candidates must be reminded to move on to Part C in good time in the examination, and to give it the same time and attention as their Introduction.

OPPOSE THE DEVELOPMENT (Dismiss Economy, Support Environment)

- **On the one hand**, I appreciate that this development has the potential to provide 378 jobs in construction and 3000 full time jobs during its lifetime. **On the other hand**, however, the mine threatens to destroy the habitat of the grizzly bear and the migratory rivers of the sockeye salmon. **For this reason, I must give priority to the environment.**
- **While I accept** that this development has the potential to generate £245 million in revenue and boost the national economy, **I cannot overlook** the 21.9% increase in Carbon Dioxide emissions and the impact this will have on the local and national scale. **For this reason, the development must be rejected.**

SUPPORT THE DEVELOPMENT (Dismiss Environment, Support Economy)

- **On the one hand**, I appreciate that this development threatens to destroy the habitat of the grizzly bear and the migratory rivers of the sockeye salmon. **On the other hand**, however, it has the potential to provide 378 jobs in construction and 3000 full time jobs during its lifetime. **For this reason, I must give priority to the economy.**
- **While I accept** that this development has the potential to increase Carbon Dioxide emissions by 21.9%, **I cannot overlook** the fact that it will generate £245 million in revenue and boost the national economy. **For this reason, the development must be accepted.**

OPPOSE THE DEVELOPMENT
(Dismiss Economy, Support Environment)

- **While the promise of** wages which are 14.9% higher than the national average is tempting, **we must not sacrifice** the beauty of our natural landscape. This development will undoubtedly impact an area 930 km² in size, damaging local ecosystems and food chains.
- **Supporters of the scheme claim that** development will help to overcome out-migration in an area of high levels of deprivation; **however, I must prioritise** the environment. The area in question is a National Heritage Site and an ASSI.

SUPPORT THE DEVELOPMENT
(Dismiss Environment, Support Economy)

- **While the development threatens** to change an area over 930 km² in size, **I must give priority to** wages which are 14.9% higher than the national average. This development will undoubtedly bring immeasurable benefits to our economy.
- **Opponents of the scheme** claim that the development will irreparably damage a National Heritage Site and an ASSI; **however, I must prioritise the economy.** By supporting the development, we will help to prevent out-migration from an area experiencing high levels of deprivation.

C Conclusion

State the Decision early.

As the Advisor to the US Government, I, Dr. Rosa McElroy, have decided to reject the Pebble Mine proposal.

Dismiss Economic Benefit

I appreciate that this area is deprived and experiencing significant reductions in population, while the Pebble Mine has the potential to help the 16-19% of people living in poverty.

Prioritise Evt.

I cannot overlook the fact that this 32km² development will negatively affect wetlands and the Brown Bear population in the Game Sanctuary. I, therefore, reject the proposal.

Dismiss Economic Benefit

On the one hand, yes, this mine promises 2000 jobs in construction and 850 jobs once operational.

Prioritise Evt.

On the other hand, I cannot overlook the fact that this development could directly destroy 131km² of Salmon Streams, thus hindering their ability to migrate and spawn. This environmental concern greatly outweighs the promise of jobs.

Dismiss Economic Benefit

I appreciate that Alaska could benefit from over \$420 million over a period of 20 years. However, this

Prioritise Evt.

does not compensate for the significant threat posed by tailings. The requirements to relocate and monitor the tailings are concerning. An accidental spill would be catastrophic. And while an earthquake has not occurred in 11,000 years, we know that they are difficult to predict in terms of location, time and scale.

Emphasise that the environmental concerns are too great to ignore.

Overall, then, I have decided to reject this proposal. Clearly, the overall benefits next with protecting the environment, even if the economic benefits are tempting. Clearly, Joel Remolds,

Quote

Director of NREDE agrees when he says that this "is the most consequential land use decision... pitting an essentially eternal supply of food against an essential eternal supply of power." I believe, in my role as Advisor, that we cannot take this risk and reject the proposal.

Top Tips for Success

Timing: 30 minutes reading and annotating the resources and 60 minutes to draw your graph and write your report (1 mark per minute).

Resources: make use of the full range of resources and make your use of non-text resources very obvious.

Avoid verbatim: Write it in your own words. Less is more!

Be precise: figures and statistics are much more valuable.

Master the terminology specific to the case study.

Maximise your 12 marks in FRG.

Support

The screenshot shows the CCEA website's support page for GCE Geography (2018). The browser address bar displays the URL: ccea.org.uk/post-16/gce/subjects/gce-geography-2018/support. The page features a navigation menu with links for Students/Parents, Employers, Examiner/Centre Support, CCEA Regulation, and Accessibility Tools. Below this is a horizontal menu for different educational levels: Pre-School (Age 3-4), Foundation Stage (Age 4-6), Key Stages 1 & 2 (Age 6-11), Key Stage 3 (Age 11-14), Key Stage 4 (Age 14-16/Qualifications), Post-16 Qualifications, SEN Inclusion, and Gaeloideachas Irish Medium. A secondary navigation bar includes Overview, Connections, Entry Level, Vocational, GCE, Learning Resources, and Support. The main content area has a breadcrumb trail: Home > Post-16 > GCE > Subjects > GCE Geography (2018) > Support. The page title is "GCE Geography (2018) Support". A filter menu is active, showing "A2 3 Support" selected. Below the filter, there is a list of resources:

- Circulars**
- Past Papers & Mark Schemes** >
- Reports** >
- Support**
- Webinars**
- Administration**

elsewhere on ccea.org.uk

Support

- General
- Grade Boundaries
- Specimen Assessment Materials
- AS 1 Support
- AS 2 Support
- AS 3 Support
- A2 3 Support**

- Exemplification of Examination Performance
- A2 3 Tacaíocht

- PDF** **A2 3 Decision Making in Geography eGuide**
PDF | 1.06 MB - last updated 27/09/2019
- PDF** **A2 3 Decision Making Mat**
PDF | 308.63 KB - last updated 27/09/2019
- PDF** **A2 3 Student Guidance Decision Making in Geography**
PDF | 717.25 KB - last updated 27/09/2019
- PDF** **Teacher guidance on preparing candidates for A2 Geography Unit 3 Decision Making in Geography**
PDF | 296.24 KB - last updated 10/04/2024