UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education
General Certificate of Education Ordinary Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

ENVIRONMENTAL MANAGEMENT

0680/04
5014/02

Alternative to Coursework

May/June 2008

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Ruler

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use a soft pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
Study the appropriate Source materials before you start to write your answers.
Credit will be given for appropriate selection and use of data in your answers and for relevant interpretation of these data. Suggestions for data sources are given in some questions.
You may use the source data to draw diagrams and graphs or to do calculations to illustrate your answers.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use

This document consists of **18** printed pages and **2** blank pages.

Fig. 1 map of the World

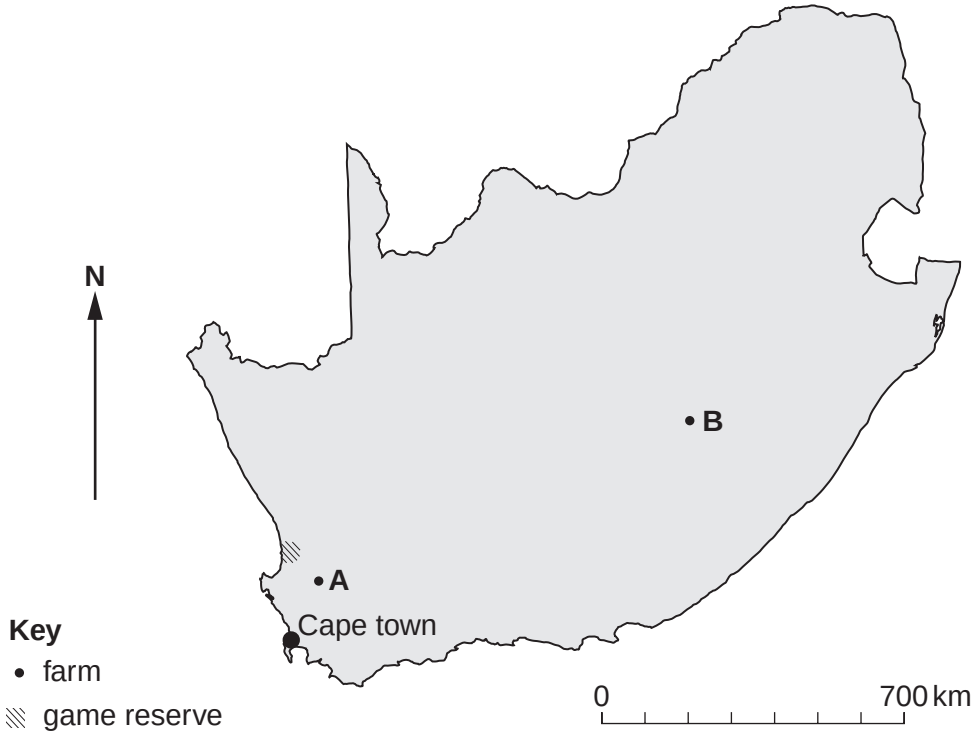

Fig. 2 map of South Africa

South Africa is rich in natural resources with well developed financial, legal, communications, energy and transport sectors. A good infrastructure supports the efficient distribution of goods to urban centres. However there is still high unemployment and poverty.

- Area: 1 200 000 sq km
- Population; 45 000 000
- Children per woman: 2.2
- Life expectancy at birth: 42 years
- Currency: Rand (6–10 rand per US dollar)
- Languages: English, Afrikaans, Isizulu, Sepeli, English, others
- Climate: Semi arid, subtropical along the east coast
- Altitude: 0 to 3 408 m
- Agricultural products: maize, wheat, sugar cane, fruits, vegetables, beef, poultry, mutton
- Industries: mining, textiles, iron and steel, chemicals.

1 **(a)** South Africa has several large national parks and game reserves. Many tourists visit the country to see wild animals, including two rare species of rhino.

The rhinos have become rare because their horns are in demand for medicines in other countries. Poachers illegally kill the animals and remove the horns. The wild animals are protected by game wardens but the rhinos are still being killed. Recent changes in the rhino population are shown in Fig. 3.

Year	White rhino	Black rhino
1986	3800	4000
2006	5500	400
% gain/loss	+45	

Fig. 3 changes in the rhino population

(i) Calculate the % loss for the black rhino.

.....

..... [1]

(ii) If the losses were to continue at the same rate, in which year would the black rhino become extinct?

..... [1]

(b) A scientist suggested that rhinos could be captured, sedated and have their horns cut off, as shown in Fig. 4.

The animal is then released but is of no value to poachers. An experiment of this horn removal was carried out in one game reserve. The number of rhinos was counted at the beginning of the experiment and after one year.

Fig. 4 horn sawing

The population was surveyed a year later.

	At the start of experiment	One year later
Estimated rhino population	200	220
Rhinos with horns removed	24	12

Suggest **two** reasons why the numbers of rhinos with horns removed have decreased.

.....

..... [2]

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(c) (i) Another scientist found that the horns slowly grow back so they decided to stop removing the rhino horns.
The scientists talked to some local people and found that most

- complained that their fields had been damaged by rhinos
- knew someone involved in poaching
- found rhino meat good to eat
- felt that daily life was easier with fewer rhinos

The scientist started writing a questionnaire to find out more accurately how people felt about rhinos.

You have been asked to complete the questionnaire. The first two questions have been done for you.

1 How long have you lived in your village?

Less than a year ☐ 1–4 years ☐ 5–10 years ☐

more than 10 years ☐

2. How often do you see a rhino?

never ☐ once a month ☐ once a week ☐ twice a week ☐

every day ☐

3. .....

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4. .....

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5. .....

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.....[4]

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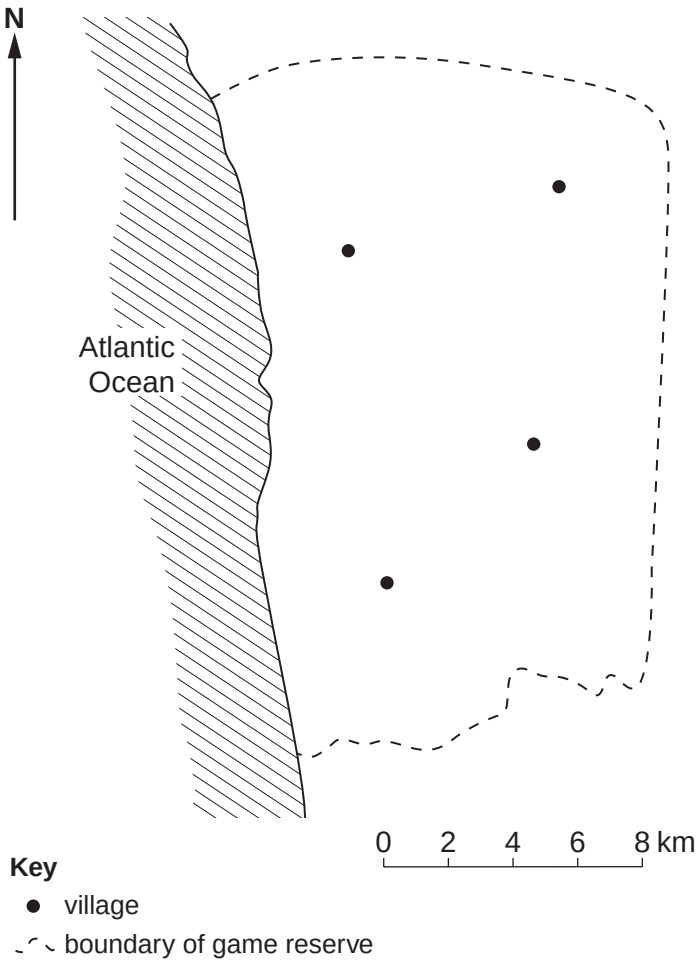

Fig. 5 map of game reserve

Using the questionnaire, you have been asked to interview people living in the reserve shown in Fig. 5. You do not have time to interview everyone.

(ii) Describe, in detail, how you would collect a fair sample of the views of the people living in the game reserve.

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.....[3]

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(d) A third scientist proposed that the government should allow the rhinos to become the property of the local people and of the owners of some large farms. The government will give them a licence to shoot rhinos and sell the meat and horn for a trial period of three years.

(i) Explain how this proposal could prevent the rhino becoming extinct.

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.....[2]

(ii) Draw a suitable table for the owner of one large farm to record the results of the trial over three years.

[3]

(e) Another scientist proposed that rhino horn should be 'harvested' by local people and sold to the government for legal international trade. The horns grow back and can be 'harvested' again.

Explain why this could provide a very good future for

(i) local people, ...

.....

.....

(ii) rhinos. .....

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.....[4]

2 **(a)** Much of the land in South Africa is semi-arid so planting crops has to be carefully managed to prevent crop failure.

Look at the temperature and rainfall data in Fig. 6.

	Farm A		Farm B	
Month	Average temperature °C	Rainfall mm	Average temperature °C	Rainfall mm
January	26	15	30	91
February	26	8	28	78
March	25	18	26	76
April	22	48	23	55
May	19	79	19	25
June	18	84	17	8
July	17	89	16	10
August	18	66	19	20
September	18	43	23	20
October	21	32	26	51
November	23	18	27	60
December	24	10	29	66
total		510		560

Fig. 6

(i) Name the wettest four months on each farm.

A .....

B ..... [1]

(ii) Name the driest month on each farm.

A .....

B ..... [1]

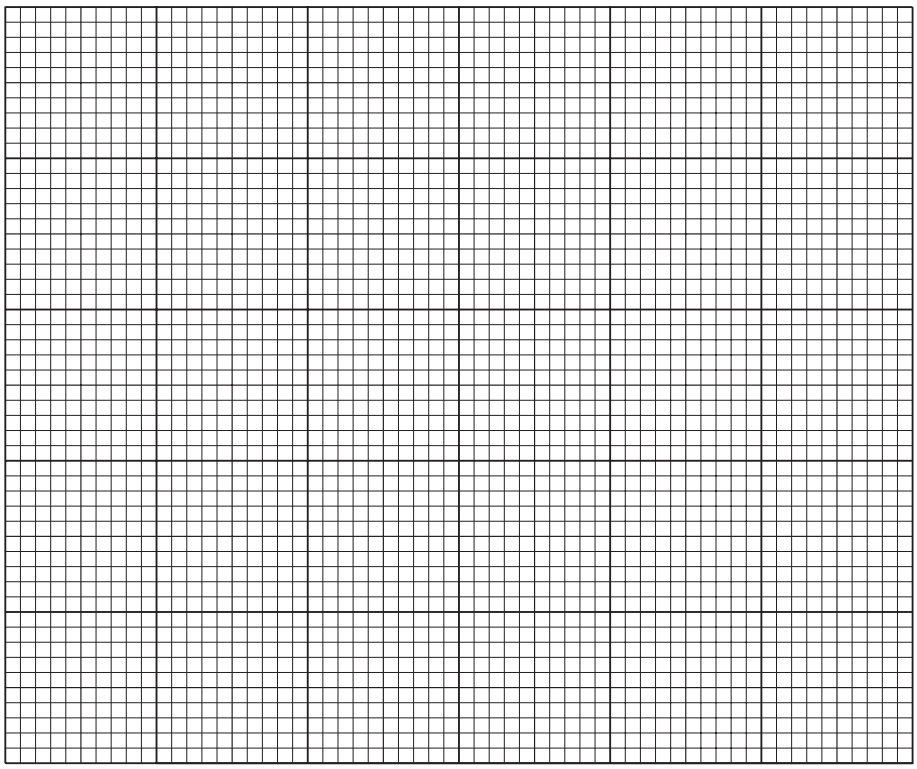
Farm A grows vegetables for sale in Cape Town. Between December and March the plants grow rapidly but in some years growth is reduced by lack of rainfall.

The farmer carried out a trial growing peas using trickle drip irrigation in part of a field measuring 5 m by 5 m. The results of the trial are shown in Fig. 7.

	Number of pea pods	
Days from planting	Natural rainfall only	Natural rainfall and trickle drip irrigation
0	0	0
7	6	12
14	52	74
21	80	110
28	120	154
35	146	210
Mass of pods kg	2.0	2.4

Fig. 7

(iii) Plot a graph of the number of pea pods against days from planting for both methods.



[4]

(iv) Describe the trend shown by both groups of plants.

For Examiner's Use

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..... [1]

(v) Calculate the % increase in yield from the trickle irrigated plants.

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..... [2]

(vi) Suggest **two** pieces of information the farmer needs to know before starting to grow peas with trickle drip irrigation on a large scale.

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..... [2]

(vii) To make sure that the extra work of trickle drip irrigation is effective the farmer decides to carry out a large scale field trial.

The following factors were the same for both trial plots:

- rainfall
- slope angle
- aspect
- area
- .....
- .....

Add two other factors that should be the same for both plots. [2]

(viii) To make the field trial fair and accurate describe, in detail, how the farmer should carry out

the planting,

.....

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.....

the pod counting at 35 days,

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a comparison of the yield.

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(b) Farm B, 300 km from Cape Town, does not have access to water supplies for irrigation. The farm has the following information and wants to farm sustainably.

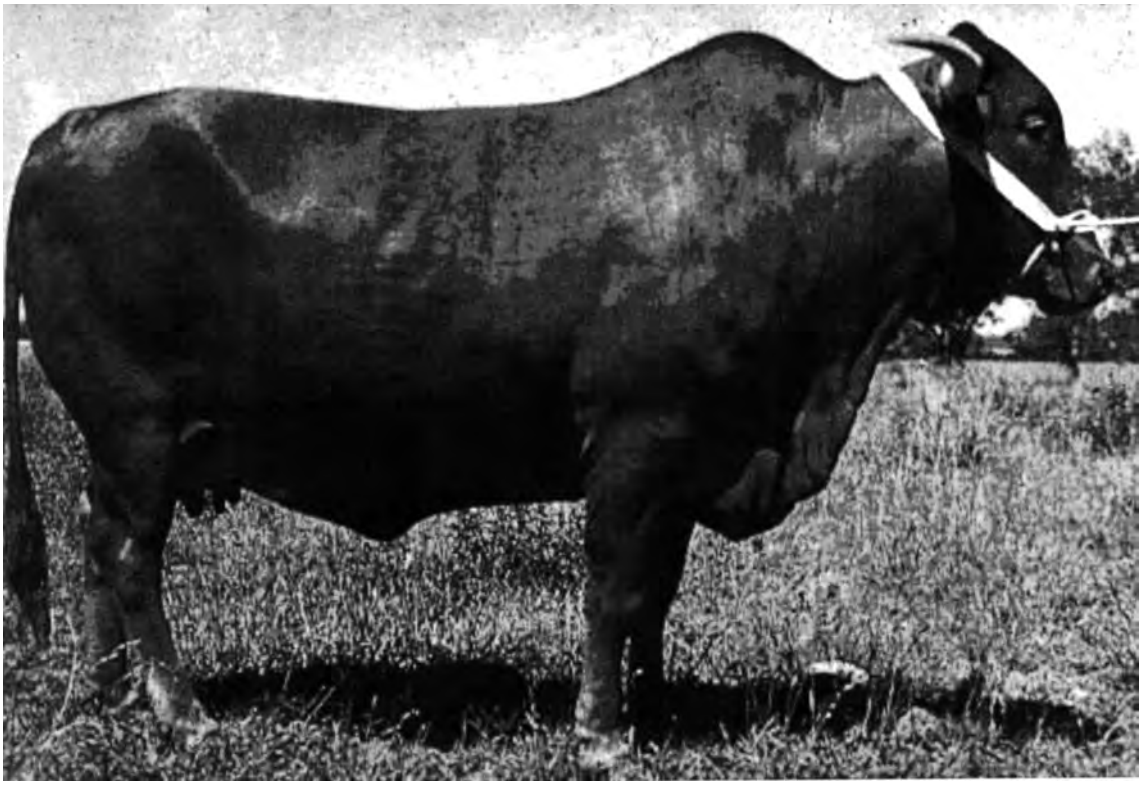

Fig. 8 African cattle

African cattle

- feed on natural grassland/crop residues
- heat tolerant
- resistant to parasites especially ticks
- low mortality rate for calves

Fig. 9 chickpeas

Chickpeas

- Grow well in a hot climate (16–30 °C) with dry periods
- Grow well in soil unsuitable for trees
- Stem elongation slowed by low temperatures
- Grown up to 8 years without rotation

Using the information and your own knowledge describe a ten year sustainable farming plan for farm B.

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.....[5]

3 South Africa is the world's leading producer of gold. This mining industry employs many people. Rocks bearing gold are crushed and the gold extracted. The crushed rock usually becomes an industrial waste.

However a chemical, sodium cyanide, can be washed through the waste rock to extract more of the finest particles of gold. The used chemical is then held in large ponds lined with plastic.

The procedure is shown in Fig. 10.

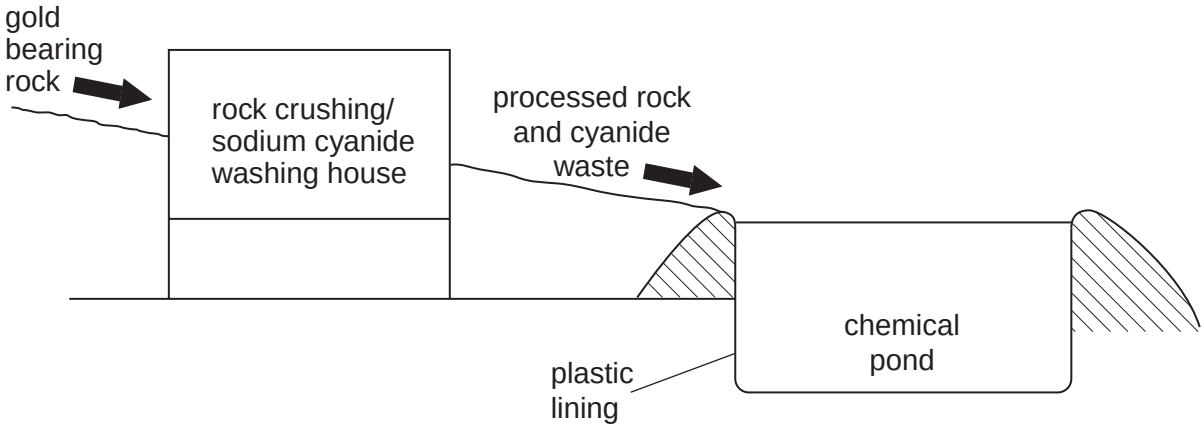

Fig. 10 crushed rock to ponds

(a) Suggest two risks the gold miners face using this chemical extraction method.

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.....[2]

(b) The chemical may only extract another 3% of gold from the rock but the mining companies still want to buy the chemical.
Explain why.

.....

.....[1]

(c) Mining companies claim they check all their stored waste regularly and there is no risk to the environment or local people. They claim the cyanide breaks down when exposed to sunlight and oxygen.

(i) Suggest **two** reasons why the chemical ponds should be covered.

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.....[2]

(ii) Describe the likely sequence of events following a break in the plastic lining.

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(d) A new mine is being developed in a rural area and the proposed layout is shown below.

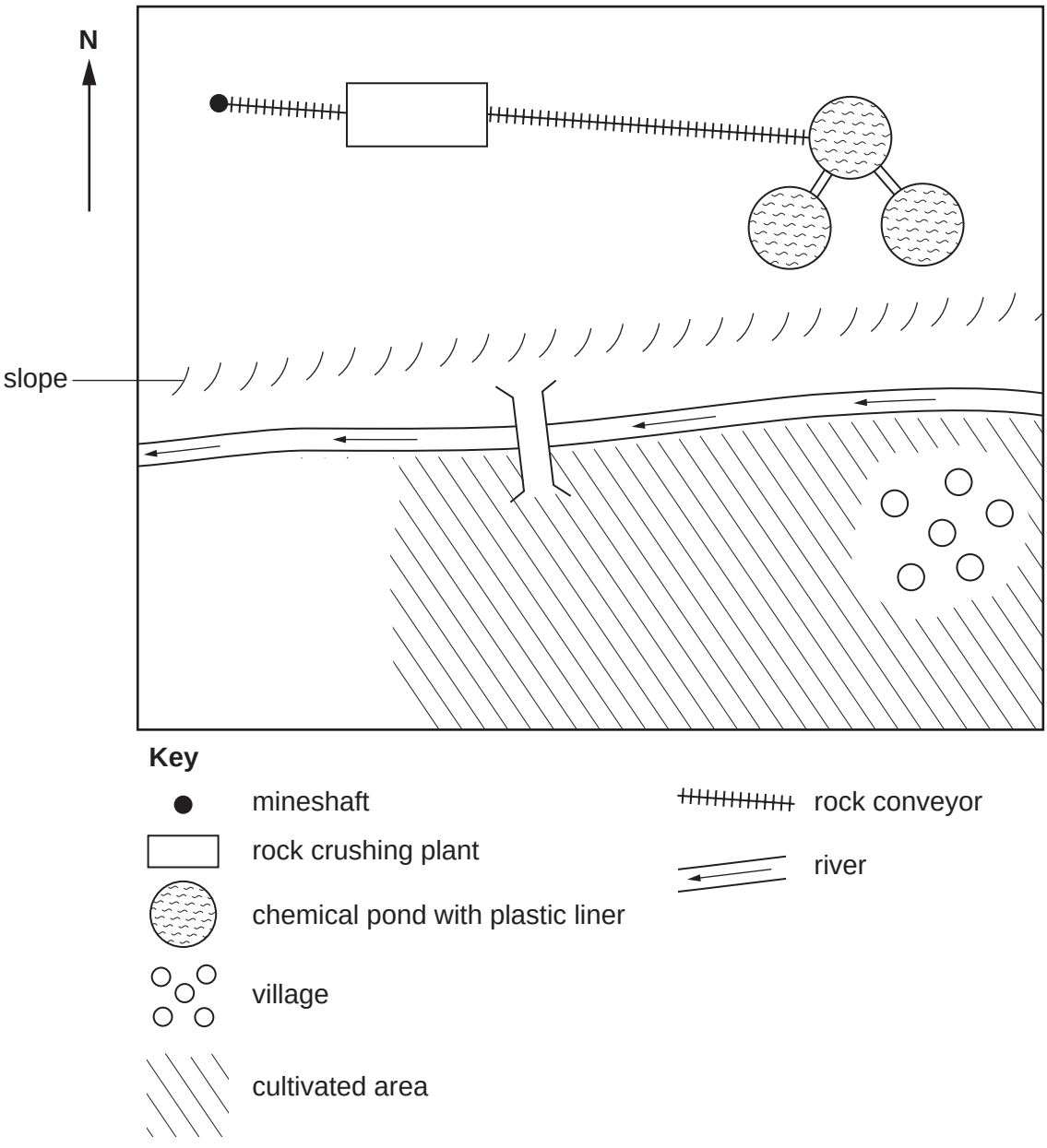

Fig. 11 map of proposed new mining area

Suggest why some local people

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(i) want the mine developed, ...

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.....

(ii) do not want the mine developed. .....

.....

..... [3]

(iii) Suggest what is good about the plan.

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..... [1]

(iv) Suggest one possible problem with it.

.....

..... [1]

(e) You have been asked to prepare an improved plan. The positions of the mine shaft and village cannot be changed and the rock crushing plant and the chemical ponds are still needed.

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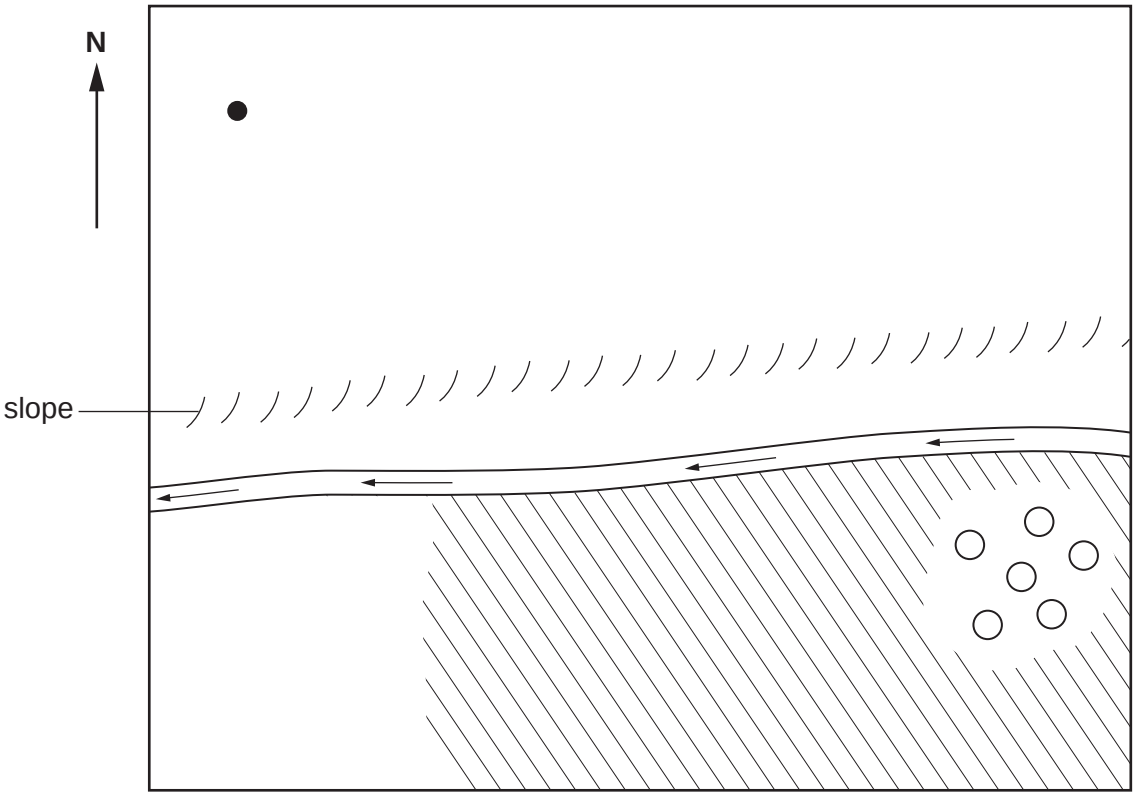
(i) Draw your improved layout on the outline plan below.



Key

- mineshaft
- village
- cultivated area
- river

(ii) Explain why your plan is better than that of the mining company.

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(f) The villagers will need to check that the river is still biologically healthy after the mining starts. Describe how they should do this.

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