NATIONAL SENIOR CERTIFICATE EXAMINATION
NOVEMBER 2022

GEOGRAPHY: PAPER II

MARKING GUIDELINES

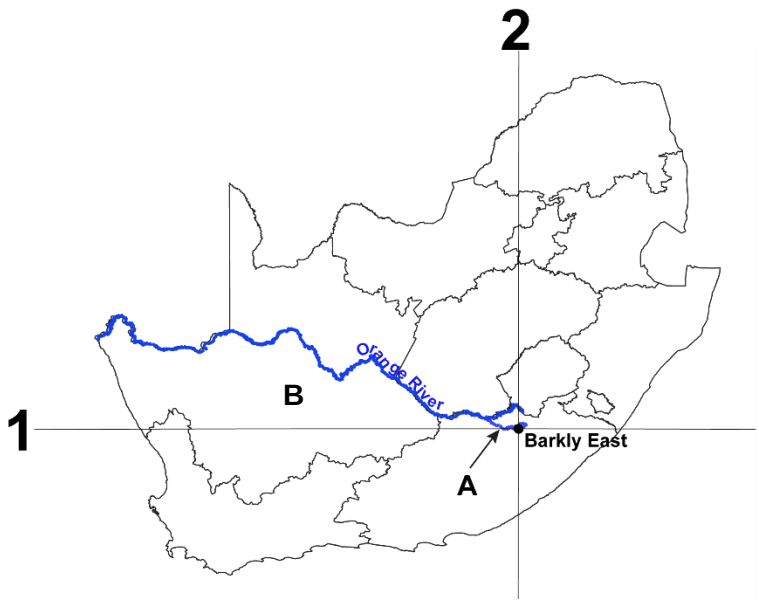
Time: 1½ hours 100 marks

These marking guidelines are prepared for use by examiners and sub-examiners, all of whom are required to attend a standardisation meeting to ensure that the guidelines are consistently interpreted and applied in the marking of candidates' scripts.

The IEB will not enter into any discussions or correspondence about any marking guidelines. It is acknowledged that there may be different views about some matters of emphasis or detail in the guidelines. It is also recognised that, without the benefit of attendance at a standardisation meeting, there may be different interpretations of the application of the marking guidelines.

QUESTION 1 FLUVIAL GEOMORPHOLOGY, MAP SKILLS

Figure 1 – Location map



Fact File: Barkly East

- Barkly East is a small service town in the Eastern Cape at the southern tip of the Drakensberg on the Langkloofspruit, a tributary of the Kraai River, which in turn is a tributary of the Orange River. The town is at an elevation of 1 790 m.
- It has a population of less than 10 000 and the economy is dominated by the tertiary sector. Sheep farming and mining contribute a very small percentage to GDP.
- Tourism along the Maloti Route is seen as a possible growth sector, with the ski resort of Tiffindell being close by.

[Source: Examiner]

Refer to the location map above, the topographic map extract 3027 DC BARKLY EAST and the orthophoto map extract to answer the questions that follow.

1.1 Name the province labelled **B** on the location map in Figure 1.

Northern Cape	X
Free State	
Eastern Cape	
KwaZulu-Natal	

1.2 The point at which the Kraai Rivier (**A** in Figure 1) meets the Orange River is known as a ...

watershed.	
confluence.	X
interfluve.	
rejuvenation.	

1.3 The Orange River is an example of a(n) … river.

non-perennial	
periodic	
episodic	
exotic	X

1.4 The Orange River drains into the (1.4.1) Ocean in a(n) (1.4.2) direction. Choose from the options below.

Indian	Atlantic	Pacific	easterly	westerly	northerly

1.4.1 **Atlantic**

1.4.2 **Westerly**

1.5 The Orange River forms the international border between South Africa and …

Botswana.	
Mozambique.	
Namibia.	X
Zimbabwe.	

1.6 The major watershed of the Orange River is the ...

Witteberg.	
Drakensberg.	X
Magaliesberg.	
Roggeveld.	

1.7 1.7.1 The Kraai River is in its upper course. Choose THREE pieces of evidence from the topographic map extract to prove this. Circle the correct options.

waterfalls	braiding	floodplain	gorge
parallel drainage	oxbow lake	marshland	alluvial fan

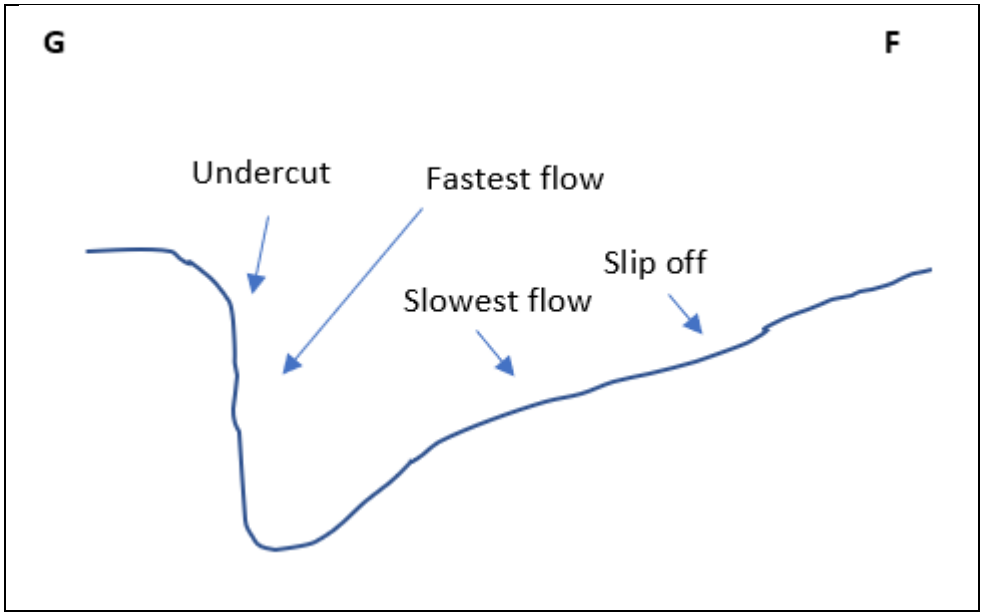
Max of 2 marks if more than 3 correct answers chosen. If all options are circled the ZERO is awarded.

1.7.2 Study the section of the Kraai River at grid block reference C/D 1/2 labelled **G–F**.

(a) Draw a simple cross profile from **G** to **F**. Identify the following:

- slip-off slope, undercut slope, slowest flow, fastest flow.

One mark will be awarded for correct orientation.

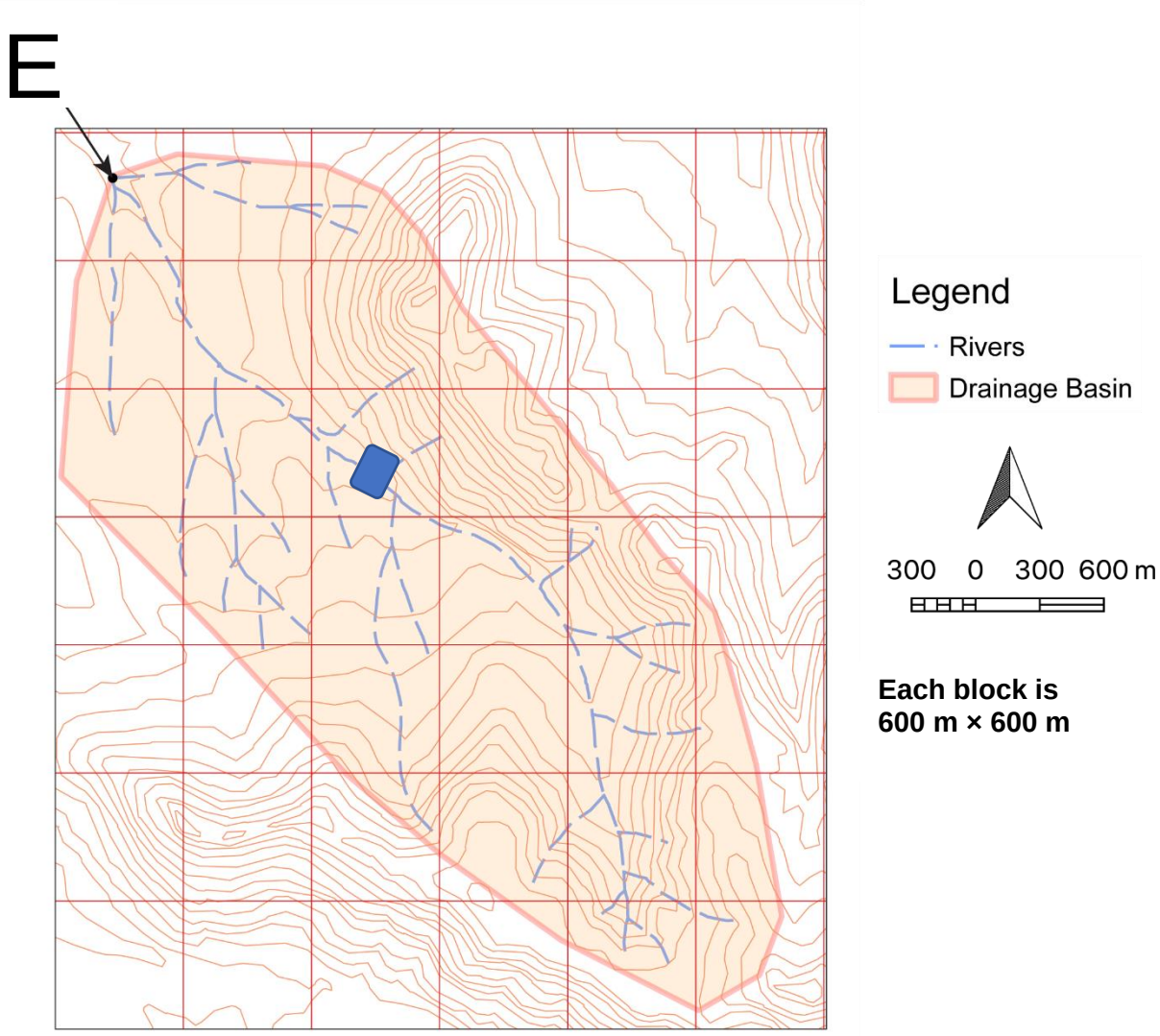


(b) Provide a reason for the presence of cultivated land on this bend.

- **The river's flow is slowest here and therefore deposition takes place and makes this land fertile for farming.**
- **Flat/gentle sloping land suitable for farming**
- **Access to water being close to the river**

1.8 Study Figure 2.

Figure 2 – Drainage basin of river system E (indicated by red polygon on the topographic map extract)



1.8.1 Complete the stream ordering table below of these rivers as they drain towards **E**.

Stream order 1	Stream order 2	Stream order 3
25	**6**	**1**

1.8.2 The dam is missing in Figure 2. Using the correct conventional symbol (do not worry about colour), draw the dam in the correct place on Figure 2.

1 mark awarded for another symbol used in the correct space.

NOTE: THIS QUESTION MUST BE COMPLETED ON FIGURE 2 ABOVE.

1.8.3 How could the law of stream ordering have helped the owner choose the correct location for the dam?

The number of first-order streams and other orders will give him an idea of how much water will fill the dam.

1.8.4 The estimated area of this drainage basin is …

1 800 000 m^2	
3 600 000 m^2	
6 120 000 m^2	X
9 000 000 m^2	

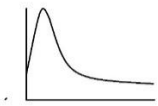
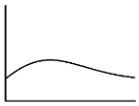
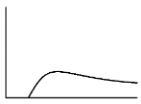
Calculations:

Approximately 17 squares × (600 m × 600 m) is:

17 × 360 000 m^2 = 6 120 000 m^2

No method mark awarded here

1.8.5 This drainage basin could be described as long and narrow. A gauging station records data during a summer thundershower and a flood hydrograph is produced. Choose the most appropriate hydrograph from the options below.

Option	Hydrograph	Indicate your choice below (write only 1, 2 or 3)
1		2
2		
3		

1.8.6 Provide a possible reason for building the dam in B8.

Storage purposes for irrigation, fishing (fly), dams prevent flooding

Q1 subtotal

QUESTION 2 SETTLEMENT, MAP SKILLS

2.1 Study Photograph 1.

Photograph 1 – Farm in E5

[Source: Examiner]

2.1.1 Name the farm found here.

The Falls

2.1.2 This is an isolated farmstead. Provide ONE reason from the topographic map extract to support this statement.

- **No other settlement close by**
- **It is on the outskirts of the town (approximately 1 km) by itself**
- **Only a farmhouse and outbuildings evident**

2.1.3 Explain ONE situational factor the owners considered when establishing their farm.

- **Right next to the R56**
- **Ease of access to the nearby market of Barkly East**
- **Close to the old rail route**

2.1.4 Circle the correct option.

This farm in an ***extensive / intensive*** operation and would be classified as a ***commercial / subsistence*** farm.

2.1.5 This farm has a windpump as seen by the conventional symbol in E5 and in Photograph 2 below. Photograph 3 shows a sign on a road as you enter Barkly East.

Photograph 2 – Windpump

Photograph 3 – Sign on road

[Source: Examiner]

(a) Give TWO pieces of topographic map extract evidence (other than the windpump and non-perennial water) to prove that the mapped area is generally 'water scarce'.

- **Lots of dams, lots of reservoirs for groundwater**
- **Lack of cultivated land**
- **Low drainage density**
- **Eastern Cape region is a low rainfall area**

(b) How is the water that is drawn by the windpump stored?

In JoJo tanks (drum/tank, etc.)

(c) What evidence is there on the topographic map extract (besides the indication of a windpump and a non-perennial river) that water is available here for pumping?

Marshland or vlei or swamp

(d) Give co-ordinates of this windpump.

(i) Choose the correct latitude.

30° 57' 30" S	
30° 57' 34" S	**X**
30° 57' 38" S	
30° 57' 42" S	

(ii) Choose the correct longitude.

27° 34' 11" E	
27° 34' 15" E	
27° 34' 19" E	**X**
27° 34' 23" E	

2.2 Study Photograph 4 below.

Photograph 4 – Nkululeko (E6)

[Source: Examiner]

2.2.1 What type of settlement is evident in Photograph 4?

- **Informal settlement**
- **Derogatory but squatter camp accepted**

2.2.2 Using photographic or topographic map extract evidence, describe TWO service delivery issues people in Photograph 4 may face on a daily basis.

- **Access to proper sanitation**
- **Access to infrastructure like electricity, running water, transport links (lack of tar roads)**
- **Lack of basic services like refuse removal**

2.2.3 Explain ONE possible reason for the location of this settlement.

- **On the outskirts of the town, close enough to get to work**
- **Land might have been vacant before and then occupied by squatters**
- **Along the river for access to water**

2.2.4 Study photographs 5 and 6 below.

Photograph 5 – Road in Barkly East residential area (F6)

Photograph 6 – Graveyard (E7)

[Source: Examiner]

(a) Describe the street pattern evident in this area by studying Photograph 5 and the topographic map extract (F6).

Grid iron/rectangular planned street pattern

(b) What dangers will the residents of Barkly East (F6) face if the Commonage Dam wall should fail?

Flooding

(c) The graveyard in Photograph 6 is an example of an apartheid-style buffer. Give topographic map extract evidence to justify this statement.

It is a barrier (sandwiched) between the Nkululeko settlements and the Barkly East residents. (there needs to a mention of separation of sorts)

2.3 Study Photograph 7 below.

Photograph 7 – Photograph taken from R56 in E4

[Source: Examiner]

2.3.1 What is this feature labelled **F** in Photograph 7?

Communication tower (accept cell phone tower, network tower)

2.3.2 (a) From which position (1 or 2) along the R56 (in E4 on the topographic map extract) was Photograph 7 taken?

1	**X**
2	

(b) Provide a reason for your answer to (a) using topographic map evidence.

Tower is on the left-hand side of the road in this view. Position 2 would have shown the tower to the right. The road also curves to the right in a SE direction.

2.3.3 (a) The approximate bearing of feature **F** from where Photograph 7 was taken is …

30°.	**X**
135°.	
210°.	
325°.	

(b) The magnetic declination for 2022 is ...

26° 01' W.	
26° 12' W.	
26° 23' W.	**X**
26° 34' W.	

Calculations: **No method marks awarded here.**

(c) Calculate the magnetic bearing using your answers to (a) and (b). Complete the table using the formula below.

True bearing + magnetic declination = magnetic bearing		
30°	**26° 23'**	**56° 23'**

(2)

One method mark allowed if correct answers from (a) and (b) used.

Q2 subtotal

QUESTION 3 ECONOMY, MAP SKILLS, GIS

3.1 Study the fact file below and answer the questions that follow.

Fact File: Tourism in the area

- Tiffindell's state-of-the-art snowmaking equipment allows us to make snow throughout the winter season.
- In summer, spring and autumn, Tiffindell becomes one of the best off-the-beaten-track adventure lands in South Africa.
- Tiffindell Ski Resort is approximately 100 km from Barkly East on the R396. This is a potholed dirt road suitable for high-clearance vehicles.
- The Aliwal North – Barkly East railway line was arguably the most scenic route in South Africa with eight switchbacks (Photograph 8 on page 14) but was closed in 2001 after a disastrous accident claimed many lives.

Hint: a switchback is a zigzag-shaped bend in the rail route

[Source: <http://www.tiffindell.co.za>, Examiner adapted]

3.1.1 Choose the correct economic sector for each activity or place (tick the correct box).

Activity / Place	Economic sector			
	Primary	Secondary	Tertiary	Quaternary
Tiffindell Ski Resort			X	
Transport of agricultural products to urban areas and industrial commodities to rural areas, which was the main function of the old rail route.			X	

3.1.2 By studying the 'old rail route' that starts in E5 and runs north towards Aliwal North, and Photograph 8, explain TWO possible difficulties engineers building this rail route in 1903 would have faced. Use specific topographic map or photographic evidence.

Photograph 8 – Switchbacks (A3 and A4)

[Source: Examiner]

- **Contours close together indicating steep terrain for trains to go up**
- **Sharp bends are shown by some U- and V-shaped contour lines**
- **A deep gorge with a river crossing would have created difficulty**
- **Photograph shows that rockfalls could be a problem (retention wall)**
- **River erodes at the mountain creating instability**

3.1.3 Some of the switchbacks on the old rail route are visible in A3 and A4. Tierkrans Bridge (A4/5) is shown below in Photograph 9.

Photograph 9 – Tierkrans Bridge (A4/5)

[Source: Examiner]

Calculate the gradient the train would have had to climb from the Tierkrans Bridge to position **X** in A3. Select an appropriate answer.

Distance from Tierkrans Bridge to position **X** (A3): 4 250 m

(a) Difference in height

80 m	
100 m	**X**
120 m	
140 m	

(b) Gradient

1:53,1	
1:42,5	**X**
1:35,4	
1:30,3	

Marking:

(a) Bridge is at 1 640 m (closest contour). (River is lower) X is on the 1 740 m contour. ∴ Difference = 100 m. No other answer will be accepted.

3.2 Tourism is seen as an economic sector that could boost the local economy of Barkly East. Create a simple webpage for Barkly East Tourism showcasing Tiffindell.

	
What makes Tiffindell so attractive to visit?	• **Tiffindell's state-of-the-art snowmaking equipment allows us to make snow throughout the winter season.** • **It becomes one of the best off-the-beaten-track adventure areas in South Africa during the warmer months.** • **Recreational activities** • **Snow in Africa (2 marks)** • **Scenic (1 mark)** **2 marks can be awarded for two simply listed activities. 1 mark can be awarded for 1 well explained point**
How to get there from Barkly East? (Use at least ONE piece of topographic map evidence.)	• **head east out of Barkly East on the R396** • **follow road north for approximately 100 km** • **follow the 'other' road from the R58, north**
Activities on offer? (at least 3)	**skiing** **snowboarding** **hiking** **mountain biking** **4 × 4 routes** **birding** **fly fishing** **mountain boarding** **play in snow** **sightseeing** **relax at resort**
Possible road conditions?	• **Dirt, potholes, muddy in summer, icy in winter** • **Need a high clearance vehicle** • **Dangerous**

3.3 ER24 and Tiffindell Ski Resort want to build a helipad in the area to provide emergency services for road accidents and to airlift people to the Cloete Joubert Hospital (F6). A site needs to be chosen. You have been asked to suggest a suitable location. Use your GIS knowledge to do this.

The requirements for the siting of the helipad are:

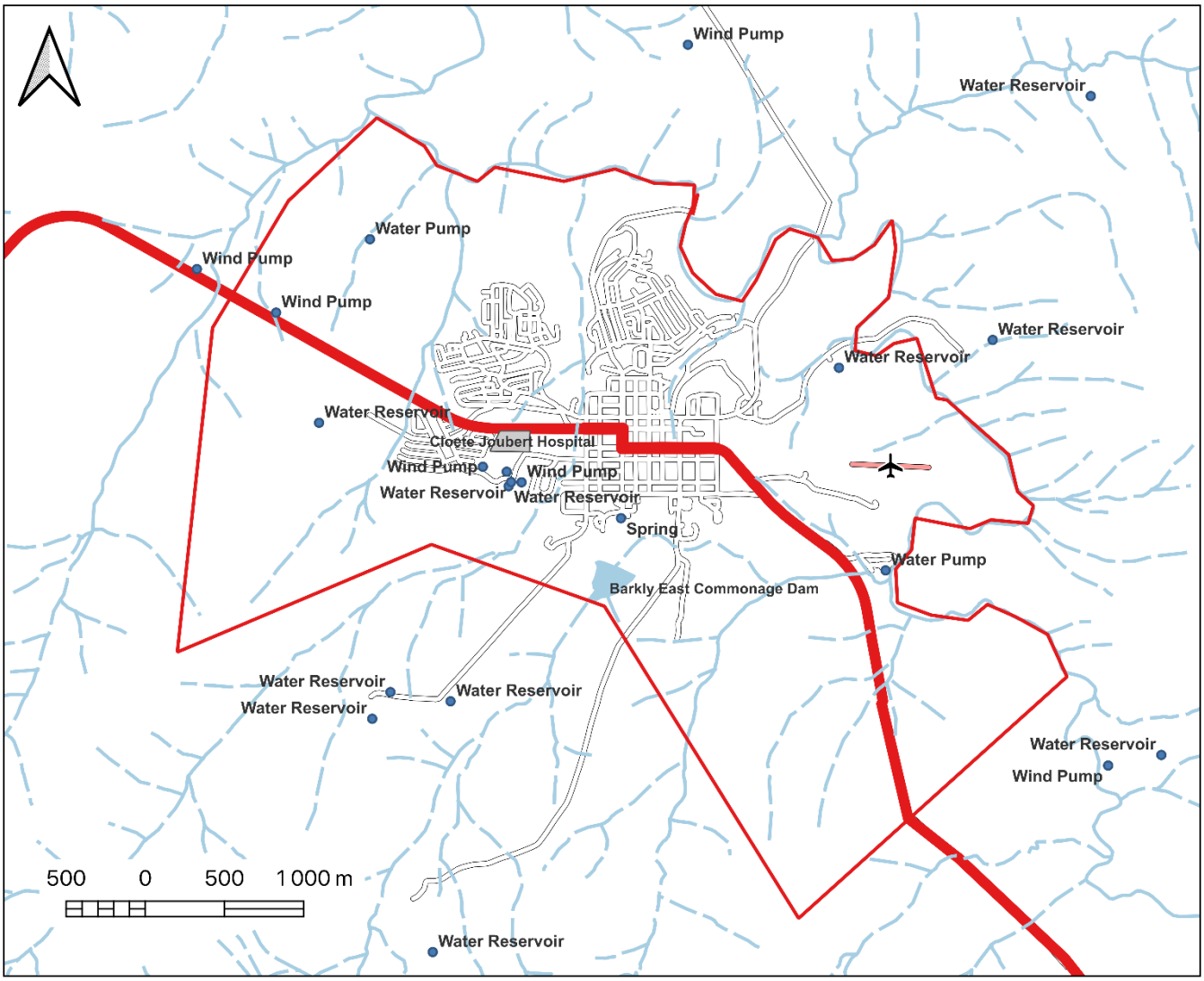
1. It must **not be in** the city limits but it must be within 500 m of the limits of the city.

2. It must be located within 500 m of any source of water.

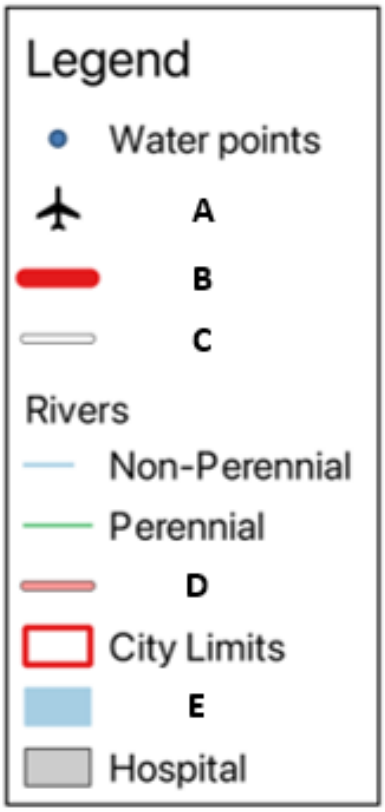
3. It must be within 250 m of a national or main/other road.

4. In addition to meeting the criteria above, it should be as close to the hospital as possible.

Figure 3 – GIS-generated map of Barkly East



3.3.1 Complete the legend for the GIS-generated map, listing all the layers shown on the map.



A – Aerodrome/airport/landing area

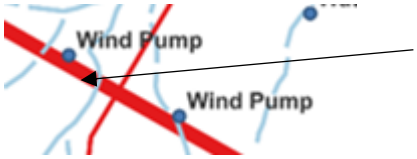
B – Main road / R58 / arterial route

C – Other road (not street)

D – Runway / landing strip

E – Perennial water/dam/commonage dam

3.3.2 Indicate on Figure 3 (page 17) the site that would satisfy all the requirements for developing the helipad. (Use the letters 'HP' to indicate the site.)



Here

Or here

These are the only two sites that can be chosen.

3.3.3 (a) What geoprocessing technique would be used if a computer had been used to determine the best site for the helipad?

Manipulation	
Buffering	**X**
Integration	
Resolution	

(b) The geoprocessing done in (a) above would be an example of …

manipulating global data.	
manipulating spatial data.	**X**
manipulating local data.	
None of the above.	

3.3.4 (a) The layer showing rivers has two legend entries. Filtering data in an attribute table based on specific content of a field refers to the following:

Attribute query	**X**
Spatial query	
Locational query	
Cartographic query	

(b) Give TWO examples of data that would be found in an attribute table containing fluvial information on the Barkly East area.

Perennial water, non-perennial water, stream order, name of river or river id, catchment

3.4 When generating this GIS map using appropriate software, the layers were arranged in the following order from top to bottom …

line, polygon, point.	
polygon, line, point.	
point, line, polygon.	**X**
polygon, point, line.	

Q3 subtotal

QUESTION 4 CLIMATE

4.1 The Barkly East area experiences an afternoon thunderstorm. An expected rainfall map for Southern Africa is shown below as well as a rainfall graph for Barkly East.

Figure 4 – Expected rainfall map of Southern Africa

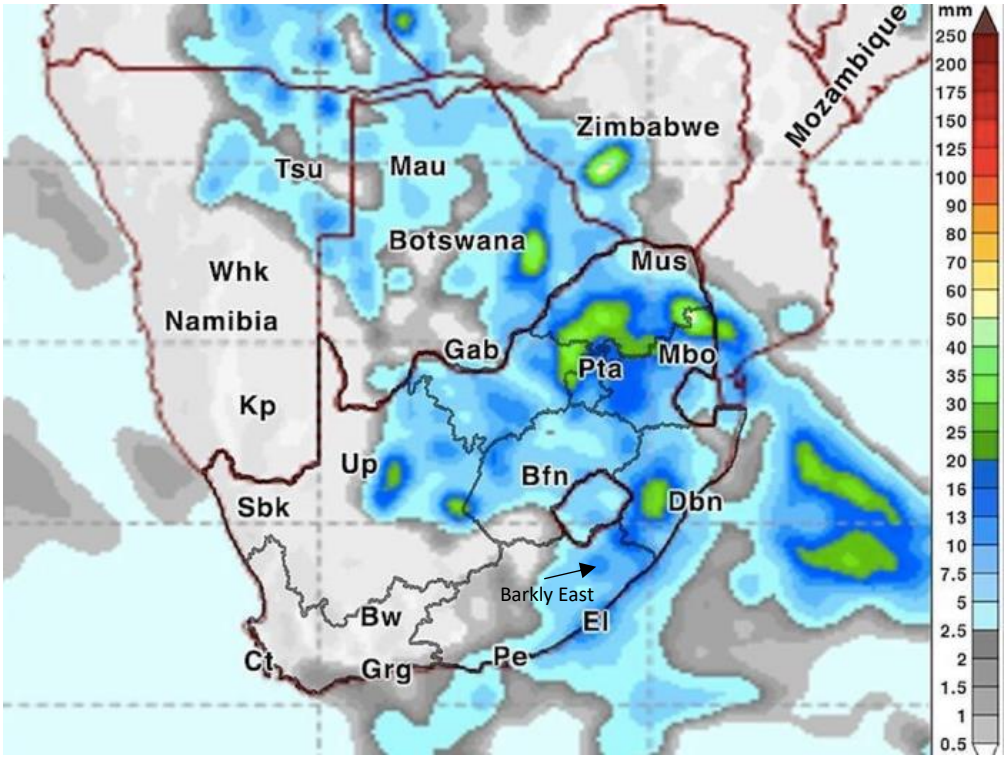
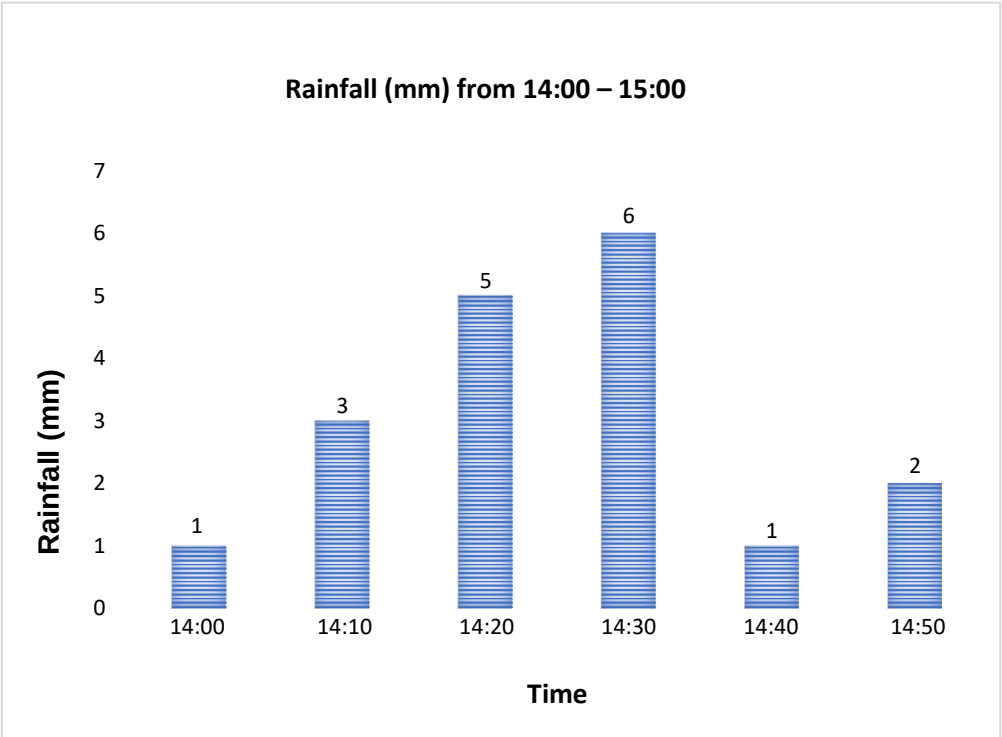


Figure 5 – Thunderstorm rainfall graph



4.1.1 Calculate the total amount of rain that fell during this storm.

18 mm

4.1.2 How long did the storm last? Circle the correct answer.

40 minutes / 60 minutes / 70 minutes

4.1.3 Provide the names of TWO neighbouring countries where heavy rain (over 20 mm) is expected.

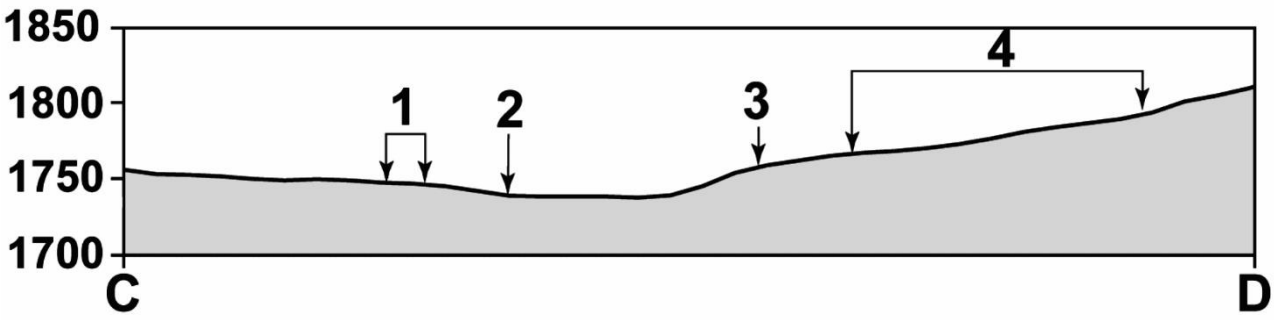
Mozambique, Botswana, Zimbabwe

4.1.4 A lot of the rain falls over the Indian Ocean on this day. Provide ONE reason for this.

- **Indian Ocean is warmer promoting mass evaporation.**
- **Agulhas current that is warm.**

4.2 The orthophoto map extract shows an area in E7/8. In a field study conducted at 6 a.m. in winter, temperatures (–2 °C and 0 °C) were recorded between C and D.

Figure 6 – Cross section from C to D



4.2.1 Study Figure 6 and the orthophoto map extract.

Provide the land uses/features evident for 1–4 on cross section C–D.

1. **perennial water/ sewerage works/ dam/water resevoir**
2. **perennial water**, **river**
3. **Good Hope Farm (accept isolated farm or farm buildings)**
4. **Cultivated land / farmland**

4.2.2 Complete the table below.

Recorded temperature	–2 °C	0 °C
Position at which temperature was recorded.	2	3
Reason for position chosen (use map extract evidence).	**Bottom of valley where river is and therefore in the frost pocket where coldest air is.**	**This is the farm which is situated midway up the slope in the thermal belt where the air is warmer.**

Q4 subtotal

Total: 100 marks