**SENIOR CERTIFICATE/
NATIONAL SENIOR CERTIFICATE**

GRADE 12

GEOGRAPHY P2

NOVEMBER 2020

MARKING GUIDELINE

MARKS: 75

These marking guidelines consist of 16 pages.

RESOURCE MATERIAL

1. An extract from the topographic map 2527CA RUSTENBURG (WEST)

2. Orthophoto map 2527 CA 15 TLHABANE

3. **NOTE:** The resource material must be collected by schools for their own use.

INSTRUCTIONS AND INFORMATION

1. Write your EXAMINATION NUMBER and CENTRE NUMBER in the spaces on the cover page.

2. Answer ALL the questions in the spaces provided in this question paper.

3. You are provided with a 1 **:** 50 000 topographic map 2527CA RUSTENBURG (WEST) and an orthophoto map 2527 CA 15 TLHABANE of a part of the mapped area.

4. You must hand the topographic map and the orthophoto map to the invigilator at the end of this examination session.

5. You may use the blank page at the end of this question paper for all rough work and calculations. Do NOT detach this page from the question paper.

6. Show ALL calculations and formulae, where applicable. Marks will be allocated for these.

7. Indicate the unit of measurement or compass direction in the final answer of calculations, e.g. 10 km; 2,1 cm; west of true north.

8. You may use a non-programmable calculator.

9. You may make use of a magnifying glass.

10. The area demarcated in RED/BLACK on the topographic map represents the area covered by the orthophoto map.

11. The following English terms and their Afrikaans translations are shown on the topographic map:

| **ENGLISH**	**AFRIKAANS**
Diggings	Uitgrawings
River	Rivier
Cemetery	Begraafplaas
Protected Natural Environment	Beskermde Natuurlike Omgewing
Technical College	Tegniese Kollege

GENERAL INFORMATION ON RUSTENBURG

Rustenburg was established in 1851 as a central place town to support a fertile farming area producing citrus fruit, tobacco, peanuts, sunflower seeds, maize, wheat and cattle. The area became a primary agricultural region with vast citrus estates due to the favourable climate.

Rustenburg is home to the two largest platinum mines in the world and the world's largest platinum refinery, which processes around 70% of the world's platinum.

Lately, the vast citrus estates in the region have been in constant decline due to pollution from increased smelting and beneficiating processes by the mines. (Beneficiation is when value is added to the raw materials.)

Rustenburg has a temperate climate. It has very warm summers and mild winters. Due to the altitude, summers are not quite as hot as one might expect. Precipitation occurs mainly in summer.

N

[Source: http://en.wikipedia.org/wiki/rustenburg]
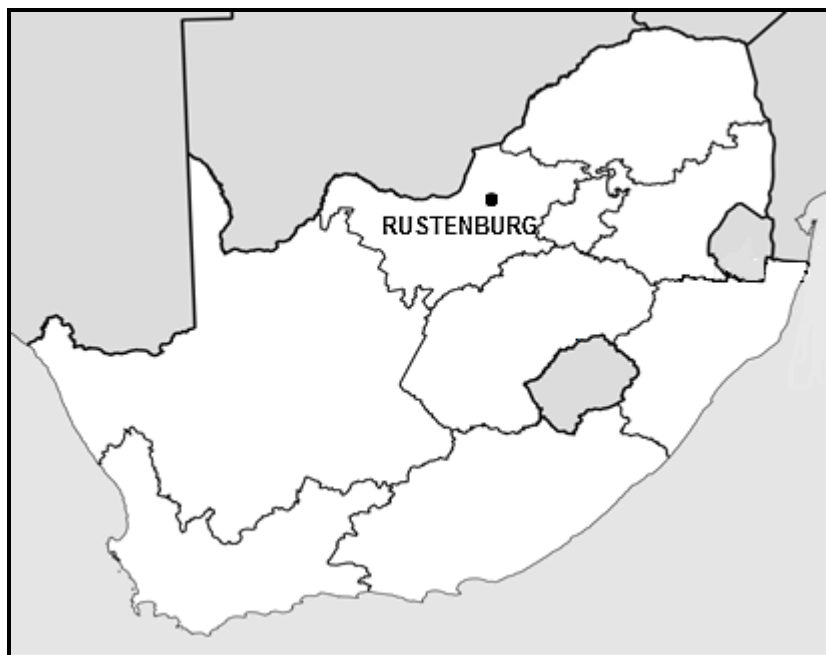
QUESTION 1: MULTIPLE-CHOICE QUESTIONS

The questions below are based on the 1 **:** 50 000 topographic map 2527CA RUSTENBURG (WEST) as well as the orthophoto map 2527 CA 15 TLHABANE. Various options are provided as possible answers to the following questions. Choose the answer and write only the letter (A–D) in the block next to each question.

1.1   Rustenburg is situated in …

    A   Gauteng.
    B   Limpopo.
    C   the North West.
    D   the Free State.

✓
C

1.2   The contour interval on the orthophoto map is … metres.

    A   5
    B   10
    C   20
    D   25

✓
A

1.3   The map index of the topographic map, south-west of 2527CA RUSTENBURG, is …

    A   2527CC.
    B   2526DD.
    C   2527AC.
    D   2526BD.

✓
B

1.4   The grid reference/coordinates of trigonometrical station 256 in block **C1** on the topographic map is …

    A   25°34'35"S 27°05'19"E.
    B   27°05'35"S 25°34'19"E.
    C   27°05'34"S 25°35'19"E.
    D   25°34'23"S 27°05'33"E.

✓
D

1.5   The approximate distance from **K** in block **H10** on the topographic map along the railway to Rustenburg in a south-easterly direction is … km.

    A   1
    B   1,5
    C   2
    D   2,5

✓
B

1.6   Stream **L** in block **B2** on the topographic map flows in a … direction.

    A   south-westerly
    B   northerly
    C   north-easterly
    D   southerly

✓
C

1.7   The climate of Rustenburg is mainly influenced by …

A   altitude.
B   fronts.
C   the ocean.
D   aspect.

✓

A

1.8   At night the … wind influences the temperatures of Geelhoutpark (**H8**) on the topographic map.

A   anabatic
B   katabatic
C   onshore
D   offshore

✓

B

1.9   The N4 passes through a … in the Magaliesberg mountain range.

A   ridge
B   valley
C   gorge
D   gap

✓

D

1.10   Land-use zone **1** on the orthophoto map is the … zone.

A   transition
B   commercial
C   residential
D   industrial

✓

D

1.11   The physical expansion of Rustenburg in a westerly direction is mostly limited by the ...

A   cultivated lands.
B   national road.
C   mountain range.
D   water features.

✓

C

1.12   Rustenburg was originally classified as a … town.

A   central place
B   specialised
C   break-of-bulk
D   trade and transport

✓

A

1.13   The main activity within the Magaliesberg Protected Natural Environment on the topographic map is part of the … sector.

    A   primary
    B   secondary
    C   tertiary
    D   quaternary

✓
C

1.14   The feature at **2** on the orthophoto map is a/an …

    A   industry.
    B   mall.
    C   school.
    D   station.

✓
C

1.15   The vertical aerial photograph from which the orthophoto map was produced was taken between …

    A   06:00 and 07:00.
    B   10:00 and 11:00.
    C   14:00 and 15:00.
    D   18:00 and 19:00.

✓
C

(15 x 1)   **[15]**

QUESTION 2: MAP CALCULATIONS AND TECHNIQUES

2.1 Refer to the hiking trail in blocks **A5** and **B5** on the topographic map.

2.1.1 Determine the 2020 magnetic bearing (MB) of the hiking trail from **M** to **N** in blocks **A5** and **B5**, if the updated mean magnetic declination (MD) is 17°40' west of true north. Show ALL calculations. Marks will be awarded for calculations.

Formula:
Magnetic bearing = true bearing + magnetic declination

Magnetic Bearing: *333°✓ (332° – 334°) + 17°40' = 350°40'✓*
(range 349°40' to 351°40') (2 x 1) (2)

2.1.2 Explain why it is important to use the magnetic bearing instead of the true bearing to determine direction on topographic maps.

Desired destination will not be reached if the true bearing is used/To reach desired destination ✓
The magnetic north changes annually ✓
Magnetic bearing gives you correct/ accurate direction ✓
(ANY ONE) (1 x 1) (1)

2.2 Refer to the orthophoto map and answer the questions on gradient.

2.2.1 Determine the average gradient of the slope for a truck that will transport its cargo (goods) from the industries at **3** (1 160 m above sea level) to the railway station at **4** (1 148 m above sea level) on the orthophoto map. Show ALL calculations. Marks will be awarded for calculations.

Formula: $\textbf{Average gradient} = \dfrac{\textbf{vertical interval (VI)}}{\textbf{horizontal equivalent (HE)}}$

Vertical interval: 1 160 – 1 148 = 12✓m

Horizontal equivalent: 16,4✓cm x 100 (range: 16,3 to 16,9)

1 640 ✓ m (range: 1 630 to 1 690)

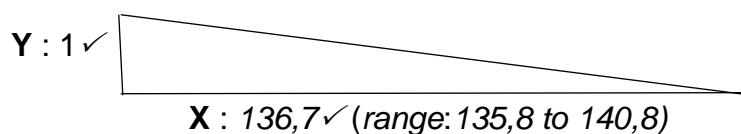$\dfrac{12}{1640}$✓ *(correct substitution)*

$\dfrac{1}{136.7}$

OR

1 : 136,7✓ (range: 1 : 135,8 to 140,8) (5 x 1) (5)

2.2.2   Fill in the correct values for **X** and **Y** in the space on the diagram below with regard to the answer to QUESTION 2.2.1.

Y : 1 ✓

X : *136,7* ✓ *(range: 135,8 to 140,8)*

*(If candidate has a different answer at **X** in Q 2.2.1 but used that answer and correctly substituted it into **X**, marks should be allocated for the conceptual understanding)*   (2 x 1)   (2)
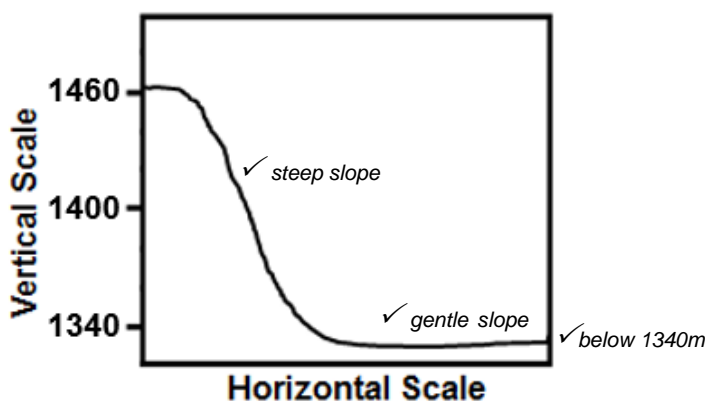
2.2.3   Why will it be easy for the truck to transport its cargo over the calculated gradient?

The slope / gradient is gentle ✓   (1 x 1)   (1)

2.3   Refer to the line drawn from spot height 1461 in block **C1** to the ruin at **O** in block **C2** on the topographic map.

2.3.1   Complete the rough cross-section below from spot height 1461 in block **C1** to the ruin at **O** in block **C2**.

(3 x 1)   (3)

2.3.2   Is the ruin at **O** in block **C2** intervisible from spot height 1461 in block **C1**? Answer YES or NO. Give a reason for your answer.

Yes OR No: *No* ✓

Reason: *The convex slope* ✓
              *There is an obstruction between **O** and spot height 1461* ✓
              (ANY ONE)   (1 +   (2)
                                                                  1)

2.3.3   Calculate the vertical exaggeration (VE) of the cross-section between spot height 1461 in block **C1** and the ruin at **O** in block **C2** if the vertical scale is 1 cm represents 20 m.

Show ALL calculations. Marks will be awarded for calculations.

Formula: **Vertical exaggeration** $= \dfrac{\textbf{vertical scale (VS)}}{\textbf{horizontal scale (HS)}}$

VS = 1:2000 ✓

HS = 1:50 000 ✓

$VE= \dfrac{1:2\,000}{1:50\,000}$ ✓ *OR* $\dfrac{\frac{1}{2\,000}}{\frac{1}{50\,000}}$ ✓

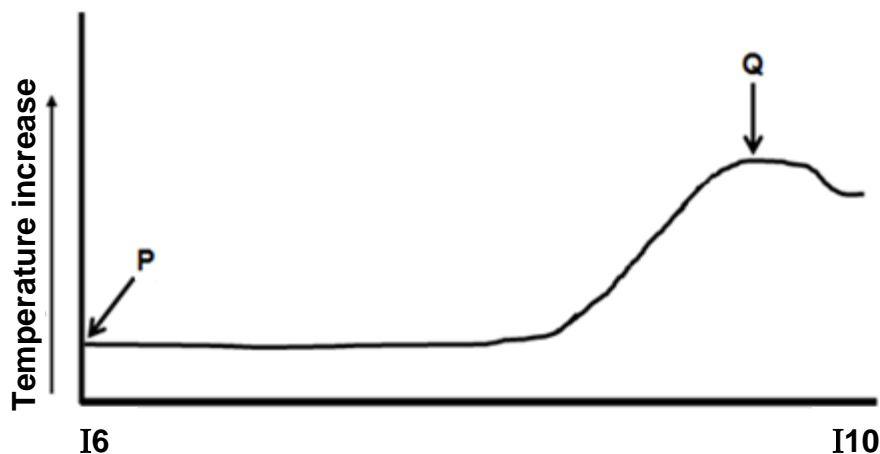$\dfrac{1}{2000}$ **×** $\dfrac{50\,000}{1}$

25 times ✓   (4 x 1)   (4)
[20]

QUESTION 3: APPLICATION AND INTERPRETATION

3.1   The temperature graph below illustrates the general temperature change during the day from spot height 1614 (**P**) in block **I6** to the technical college (**Q**) in block **I10** on the topographic map.

3.1.1   The general trend of the change in temperature from **P** to **Q** is (increasing/decreasing)

Increasing ✓   (1 x 1)   (1)

3.1.2   Give a reason from the topographic map to explain the difference in temperature at **P** and **Q**.

*The built-up area at **Q** absorbs more heat than the natural area at **P***✓✓
*The natural area at **P** absorbs less heat than the built-up area at **Q***✓✓
*The area at **P** is at a higher altitude therefore lower temperatures are experienced* ✓✓   (2)
(ANY ONE)   (1 x 2)

3.1.3   Identify and explain ONE strategy that could be implemented by the local municipality in block **I10**.

Identification	Explanation
Green belt/Recreational area/sports field✓ *(roof top gardens)*	*Plants/vegetation absorb a lot of heat for photosynthesis* ✓✓ *Vegetation absorb a lot of greenhouse gases/carbon dioxide*✓✓
Reflective paint colours✓	*Surface with high albedo reflects more heat so they stay cool.* ✓✓
Public transportation ✓	*Reduce the number of vehicles* ✓✓
Water sources ✓	*Water reduces temperature* ✓✓
Green energy ✓	*Energy saving strategies e.g. solar energy, bio mass energy* ✓✓
Legislation ✓	*Give laws and fines for excessive release of pollution* ✓✓
[ANY ONE] (1 x 1) (1)	*[ANY ONE]* *(1 x 2) (2)*

3.2   Refer to the river system in block **C7**.

3.2.1   Identify the drainage pattern of the river system in block **C7**.

Dendritic pattern✓   (1 x 1)   (1)

3.2.2   State the underlying rock structure associated with the drainage pattern identified in QUESTION 3.2.1.

Uniform /homogeneous/ similar resistant rock structure ✓
[Not examples]   (1 x 1)   (1)

3.2.3   Determine the stream order of the river system at point **R**.

3rd ✓✓ (order)   (1 x 2)   (2)

3.3 Refer to the stream flowing southwards in block **G4**.

3.3.1 In which stage of the fluvial cycle is the stream in block **G4**?

Upper course✓
(Young/Youthful/Torrent stage)   (1 x 1)   (1)

3.3.2 Give ONE piece of evidence from block **G4** to support your answer to QUESTION 3.3.1.

Contour lines point to the highest value indicating a steep sloped valley✓
Magaliesberg/ contour lines close together/ steep slopes/ mountainous area✓
Short non-perennial stream/1ˢᵗ order stream✓
Straight stream✓
Close to source✓
(ANY ONE)   (1 x 1)   (1)

3.4 Refer to blocks **C10** and **G7** on the topographic map.

3.4.1 Identify the street plans (patterns) at **S** in block **C10** and at **T** in block **G7**.

Street plan S: *Radial* ✓

Street plan T: *Irregular* ✓   (2 x 1)   (2)

3.4.2 State TWO advantages of street plan (pattern) **T** in block **G7**.

Street plan T:	*Smooth flow of traffic/ fewer intersections* ✓
	Not monotonous/not boring/ interesting suburb layout✓
	It accommodates steep slopes✓
	Saves time ✓
	Saves fuel ✓
	Not easy to hijack ✓
	Fewer accidents ✓
	Less road rage ✓
	Less noise/air pollution ✓
	Aesthetic appeal ✓
	(ANY TWO) (2)

3.4.3   Give evidence from the topographic map for the development of
         the street plan (pattern) at **T**.

         Accommodates the steep gradient/slope✓✓   (1 x 2)   (2)

3.5   Refer to the mining activities of Townlands Platinum Mines on the orthophoto
       map and topographic map.

       3.5.1   Give ONE reason evident on the topographic map that indicates that
                mining at Townlands Platinum Mines is practised on a large scale.

                Occupies a large area✓
                Service lines ✓
                Mine dumps ✓
                Slimes dams ✓
                Power lines ✓
                Conveyor belt ✓
                Shafts ✓
                Roads/ railway line✓
                Excavations ✓
                Canals/ pipelines/ reservoirs ✓
                Diggings ✓
                (ANY ONE)   (1 x 1)   (1)

       3.5.2   Explain how mining activities at Townlands Platinum Mines caused an
                environmental injustice in the area.

                Biodiversity is disturbed✓✓
                Decrease/removal of natural vegetation✓✓
                Increases soil erosion✓✓
                The occurrence of slimes dams✓✓
                Ecosystems are disturbed✓✓
                Aesthetic disturbance (no aesthetic beauty) ✓✓
                Air/ water/ land pollution/ acid rain increases ✓✓
                Noise pollution increases ✓✓
                Acid mine drainage increases✓✓
                Increases land despoliation/ scarring/ land degradation/sinkholes ✓✓
                (ANY ONE-MUST BE A QUALIFIED INJUSTICE)   (1 x 2)   (2)

       3.5.3   Discuss the positive impact that Townlands Platinum Mines has on
                the economic development of Rustenburg.

                It provides job opportunities to the surrounding community✓✓
                It provides/develops/improves the infrastructure✓✓ *(accept example of
                different types of infrastructure, e.g. road, power supply, railway, etc.
                ✓✓)*
                It brings business and investment opportunities to Rustenburg town✓✓
                Multiplier effect on all sectors (accept qualified examples) ✓✓
                *Increased earnings stimulate trade in local market and increases
                buying power*✓✓

                                                                            (4)

Local authorities improve service delivery ✓✓
Sector education training authorities (SETA) enable skills development to local population for employment in mines ✓✓
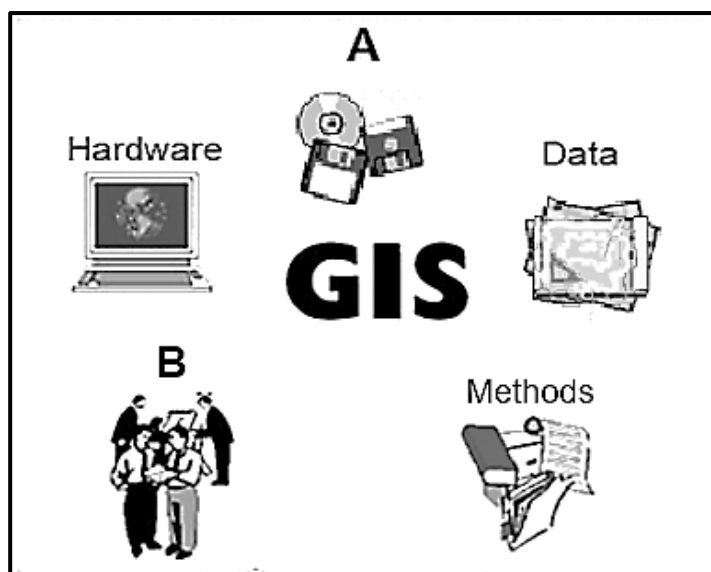*Increases foreign exchange may be linked to the point on investments* ✓✓
(ANY TWO)　　　　　　　　　　　　　　　　　　　　　(2 x 2)

[25]

QUESTION 4: GEOGRAPHICAL INFORMATION SYSTEMS (GIS)

4.1　　**COMPONENTS OF GIS**

4.1.1　　Identify the components **A** and **B**.

　　　　A: *Software* ✓

　　　　B: *People/ Personnel* ✓　　　　　　　　　　(2 x 1)　　(2)

4.1.2　　Why is component **B** important in GIS processes?

　　　　People collect/ capture/ store/ manipulate/ retrieve/ analyse/ make decisions of geographic data ✓✓
　　　　[Accept examples]
　　　　(ANY ONE)　　　　　　　　　　　　　　(1 x 2)　　(2)

4.2　　Two locations (blocks **F10** and **H7** on the topographic map) have been identified for the development of a new cemetery. A GIS specialist has been appointed by the local municipality to recommend the best site for this development.

　　　　4.2.1　　Which of the TWO locations (block **F10** or block **H7**) will be most suitable for the development of the new cemetery?

　　　　　　　　F 10 ✓　　　　　　　　　　　　　　(1 x 1)　　(1)

4.2.2   Identify TWO data layers that can be used in deciding on the new location for the cemetery.

Infrastructure✓
Relief/topography✓
Drainage ✓
Land use✓
Geology ✓
Soil ✓
Vegetation✓
(ANY TWO- NO EXAMPLES ACCEPTED)   (2 x 1)   (2)

4.2.3   Give a reason for your choice of ONE of the data layers identified in QUESTION 4.2.2.

LINK   ***Infrastructure:*** *Easy access to the cemetery*✓✓
Relief: *Flat land makes it cheaper and easier to dig graves*✓✓
Drainage: *Access to water supply /Level of water table*✓✓
Land use*: Away from areas that could create noise/to determine compatibility with the surroundings* ✓✓
Geology*: Stability of area*✓✓
Soil*: Soft deep soil makes it easy to dig graves.* ✓✓
Vegetation*: Lack of natural vegetation* ✓✓
(ANY ONE)   (1 x 2)   (2)

4.3   Refer to block **J1** on the topographic map.

4.3.1   What is v*ector data?*

Vector data is when spatial objects are represented by points, lines and polygons (areas) ✓
**(CONCEPT)**   (1 x 1)   (1)

4.3.2   Give ONE natural line feature that the farmer used to determine the site of the cultivated land in block **J1**.

River/non-perennial river/perennial river/stream✓   (1 x 1)   (1)

4.3.3 Agricultural activity in block **J1** on the topographic map is confined along the river.

(a) Draw the symbol of the point feature that is used to extract ground water to increase water supply for agriculture, on the enlarged illustration of block **J1** below. This feature must be 40 mm southwest of the Broodskraal settlement (**V**).
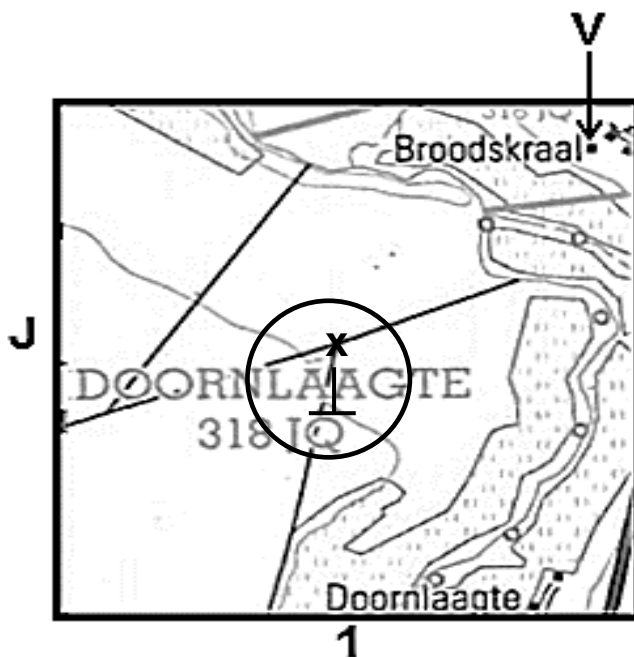
Accept 1 mark for the symbol
Accept 1 mark for the location (circle indicates the accepted range) (2 x 1) (2)

(b) Explain the advantage of this specific location of the point feature drawn in QUESTION 4.3.3(a) for farming in the area.

Cultivation can take place away from the river ✓✓
It is centrally located for accessibility to water supply✓✓
Water table is close to surface therefore constant water supply✓✓
Cultivated land can be extended✓✓

(ANY ONE) (1 x 2) (2)
[15]

TOTAL: 75