19th International Geography Olympiad

FIELDWORK EXERCISE

General Task

Material for FWE 2

Student number

1	9				

Indonesia, 2023

GENERAL TASK

Observations

Task Guideline

You will need to do this task along with the FWE Task 1 test. Note that this task **will not be marked** and **will be given back** to you during FWE Task 2. There will be an additional 15 minutes at your last spot to finish this task.

Map 1A

1. Bukit Pakar is considered as a high risk area for mass movement. On your way, identify any signs of mass movement along your route on Map 1A.

NO	SIGNS OF MASS MOVEMENT	NOTES
1		
2		
3		

NO	SIGNS OF MASS MOVEMENT	NOTES
4		
5		

2. On your way, identify and map all of the existing land use in Map 1B, located within the zone, demarcated on Map 1A within the WHITE LINE, and classify them into 8 categories:
   - Residentials,
   - Residential - Commercial Mixed Use,
   - Commercial – Café & Resto,
   - Commercial – Cultural Space,
   - Agriculture – Plantation,
   - Agriculture – Crops,
   - Forest, and
   - Others.

   Write down all the land use, including strategic features (cafés, restaurants, museums, galleries, etc.), that you had identified already in Table 1A on the response sheet, and draw and label all features on Map 1B using only pens (blue, black, or other colors, if needed), and provide the following data for them:
   - Name (for strategic features only – cafés, restaurants, museums, galleries, etc.).
   - Land-use category – 8 classes.
   - Report the condition (quality; see example below).
     Building condition (quality) assessment – 4 classes maximum:
     1. A – ruined, need to be rebuilt;
     2. B – very poor, need to be repaired entirely;
     3. C – average, serious restoration needed;
     4. D – good, no minor repairs are needed
   - Parking area capacity (for strategic features only – cafés, restaurants, museums, galleries, etc.) – mention the ability for cars and motorcycles.

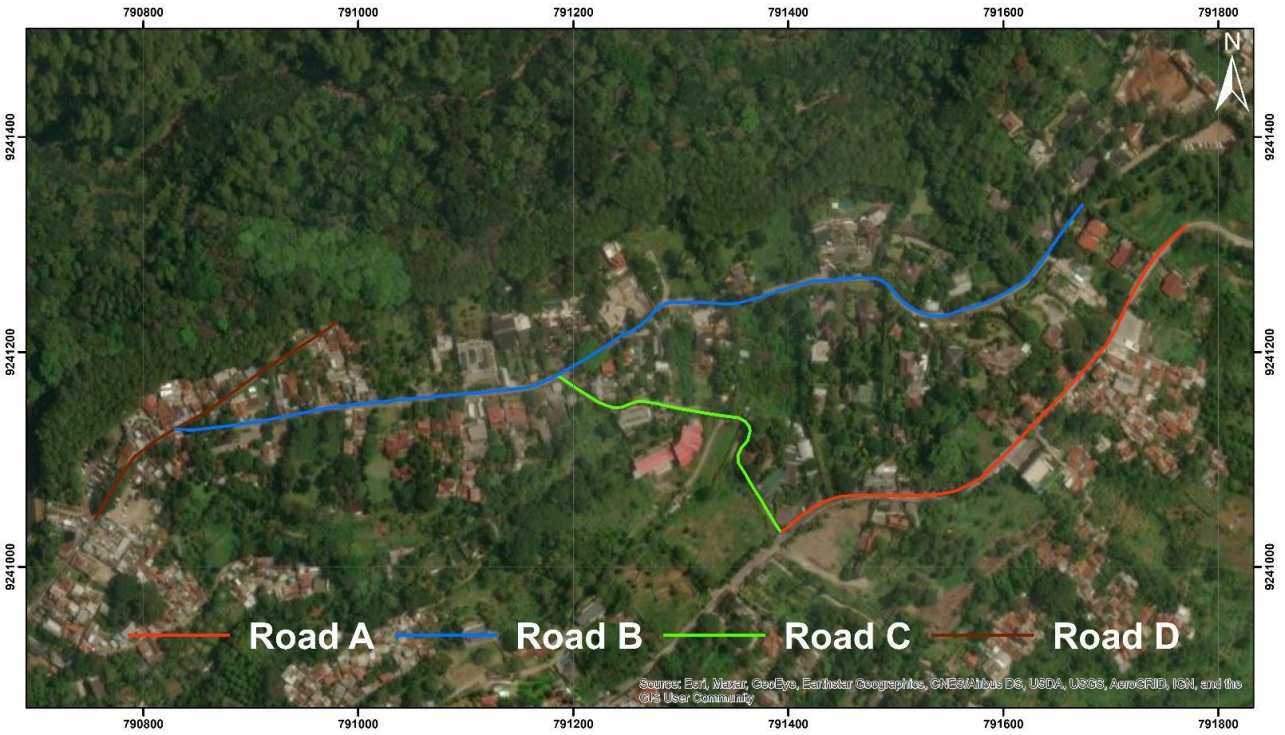
Table 1A Response Sheet

NO	NAME	LAND-USE CATEGORY	CONDITIONS	PARKING AREA CAPACITY
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				

NO	NAME	LAND-USE CATEGORY	CONDITIONS	PARKING AREA CAPACITY
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				
41				
42				
43				
44				
45				

3. **Assess the road quality** in the area by analyzing the 4 roads shown on map 1C and **describe their condition in the table below**.

Factors	Road A	Road B	Road C	Road D
Built Material				
Road Condition				
Largest vehicles that can access (Pedestrian; motorcycle/bicycle; cars; buses; and/or trucks)				
No of lanes				
Obstacles that might impede traffic				



Map 1C

STUDENT NUMBER: 19 _ _ _ _

SPOT 1

Observations (14 marks)

TIME LIMIT: 40 MINUTES.

Task Guideline

You are currently at SPOT 1 (see Map 1.1 on a separate sheet), the part of it you're looking at is built on the gentle slopes of Northern Bandung.

1. **Identify the current land use** of Bukit Pakar Area based on your observation and the satellite map (Map 1.1), **draw and label** the land use zoning on the blank map provided (Map 1.2 on a separate sheet) [2 marks]

2. **Draw arrows on Map 1.2** indicating where runoff water would flow inside the area bordered by the red line on Map 1.2 [1 mark]

3. Based on your previous analysis, **identify which land use is more likely to have a higher runoff coefficient** i.e., when it rains, higher runoff coefficient means that more water will become runoff compared to being absorbed into the soil [1 mark]

   Highest Runoff Coefficient Land Use : _____

   Lowest Runoff Coefficient Land Use : _____

4. **Point out 4 factors** that you think would be the most dominant in affecting the runoff coefficient in Bukit Pakar and **explain your reasoning** [4 marks]
   1. ……
      ……
   2. ……
      ……
   3. ……
      ……

4. .....

   .....

5. Runoff water from upstream areas can be a blessing or a curse for communities further downstream. **Point out and explain one positive and one negative** impact of Bukit Pakar's runoff water for downstream communities in Bandung [2 marks]

   Positive impact:

   .....

   .....

   .....

   Negative impact:

   .....

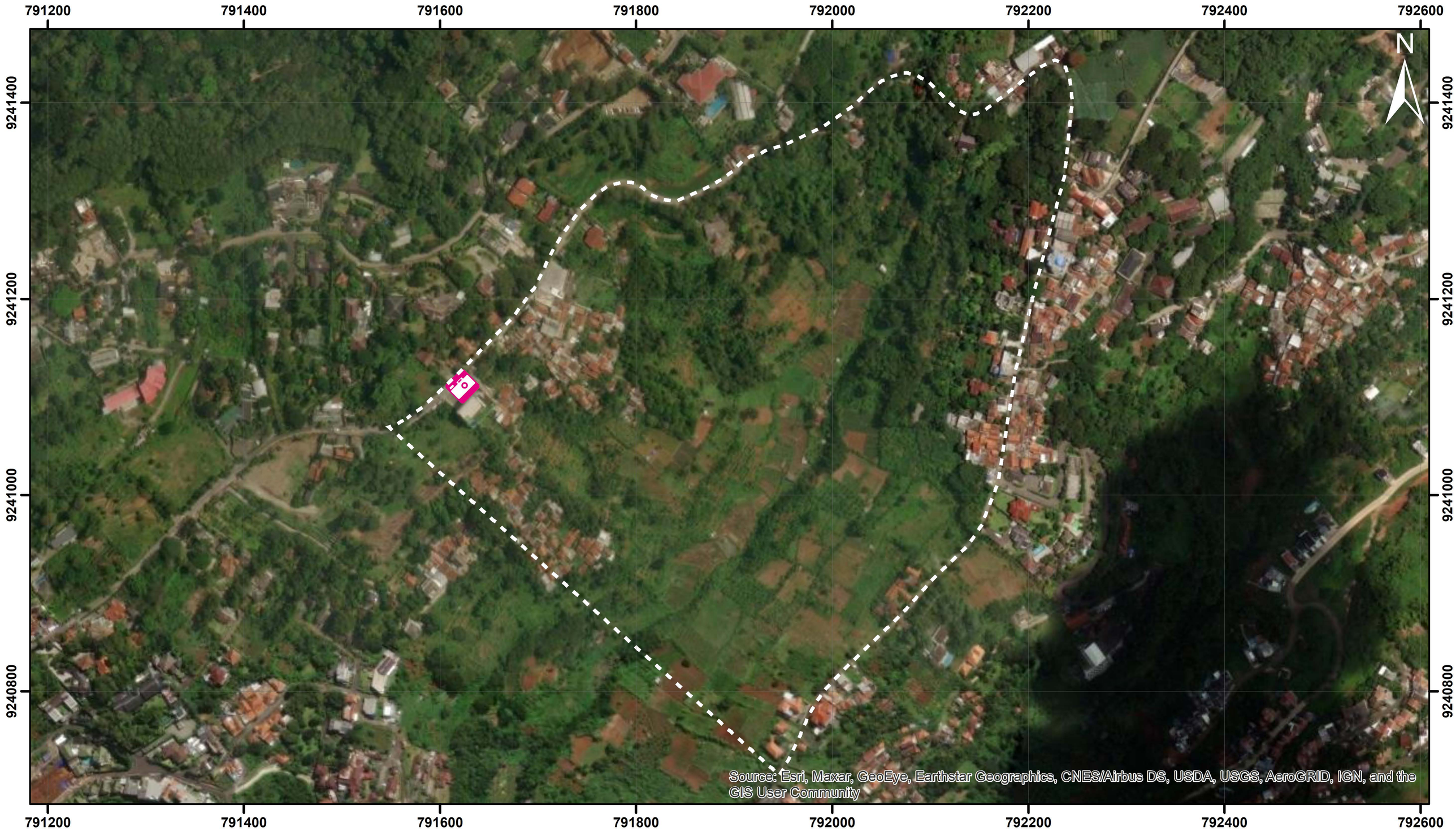
   .....

   .....

6. **Explain vegetative and structural methods** that you think would be most appropriate for reducing the runoff water in Bukit Pakar based on your observations [4 marks]

Method	Explanation

End of Question at Spot 1

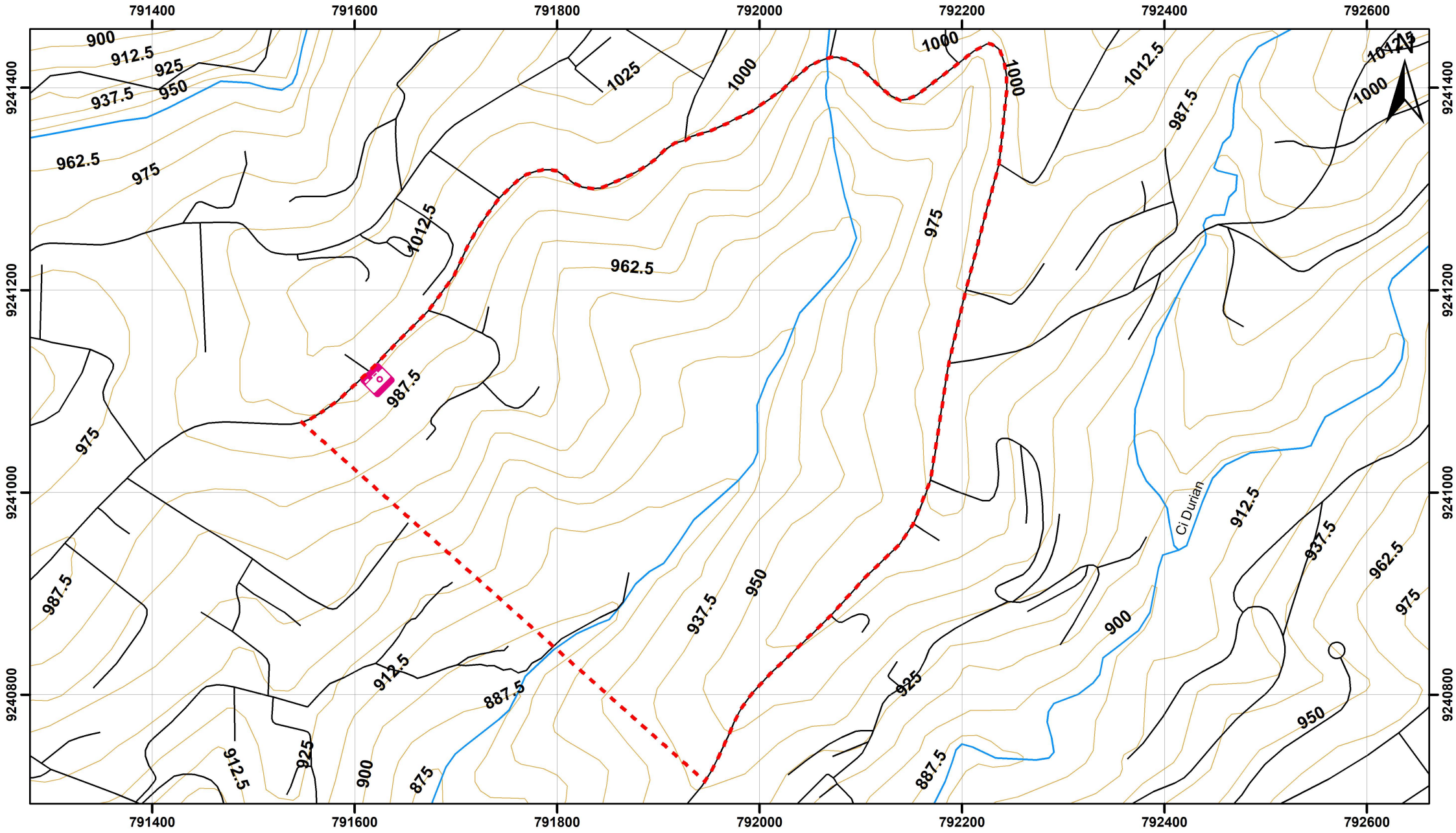


MAP 1.1

Observation Spot

Observation Area

STUDENT NUMBER: 19 _ _ _ _



MAP 1.2

Observation Spot

Observation Area

STUDENT NUMBER: 19 _ _ _ _

STUDENT NUMBER: 19 _ _ _ _

SPOT 2

Observations (14 marks)

TIME LIMIT: 40 MINUTES

Task Guideline

You are now at the SPOT 2 Station (see Map 1A on a separate sheet).

1. Draw a sketch of the geological outcrop in front of you. [5 marks]

   Hints:

   A good outcrop sketch is a sketch that is proportional to its original shape. Therefore, placement in the drawing space is an important thing to note. Furthermore, do not neglect the important elements of the sketch such as geographical location, drawing scale, outcrop dimensions, orientation, and labels of the rocks or geological structures found at the location.

2. Based on your observation of the outcrop, **fill in** the blanks below. [2 mark]

   a. Outcrop condition:

   _____

b. Outcrop colour:

_____

3. Based on your observation of the rock outcrop, **identify** the different percentages of fragments and matrices of the outcrop [1.5 marks]

ROCK DESCRIPTION		**ANSWER**
Fragment and Matrix (%)	**Block and Bomb** (>64 mm)	
	Lapilli (2 – 64 mm)	
	Ash (<2 mm)	

4. **Identify** the rock type at Spot 2. [1 mark]

_____

5. Study your surroundings, then **fill in** the condition of the tropical rainforest's layers at the Juanda Forest Park. [4.5 marks]

LAYER NAME	**PLANT DIVERSITY** *(Homogeneous/Heterogeneous)*	**HUMAN INTERFERENCE** *(Exist/Non-Existent)*	**EPIPHYTE** *(Exist/Non-Existent)*
Forest Floor			
Understory			
Canopy			

End of Question at Spot 2

STUDENT NUMBER: 19 _ _ _ _

SPOT 3

Observations (15 marks)

TIME LIMIT: 40 MINUTES.

Task Guideline

You are now at the SPOT 3 station (see Map 1A).

1. On Map 3.1 (on a separate sheet), **identify**, **map**, and **label** with numbers the facilities and buildings on the demarcated area. For all facilities and buildings, **write down** the name and their main purpose. **Estimate** their user capacity and report their existing condition using the table below. [9 marks]:

Building condition: **Good** - no or minor repair **Poor -** need major repair

NO	NAME	PURPOSE	CAPACITY	CONDITION

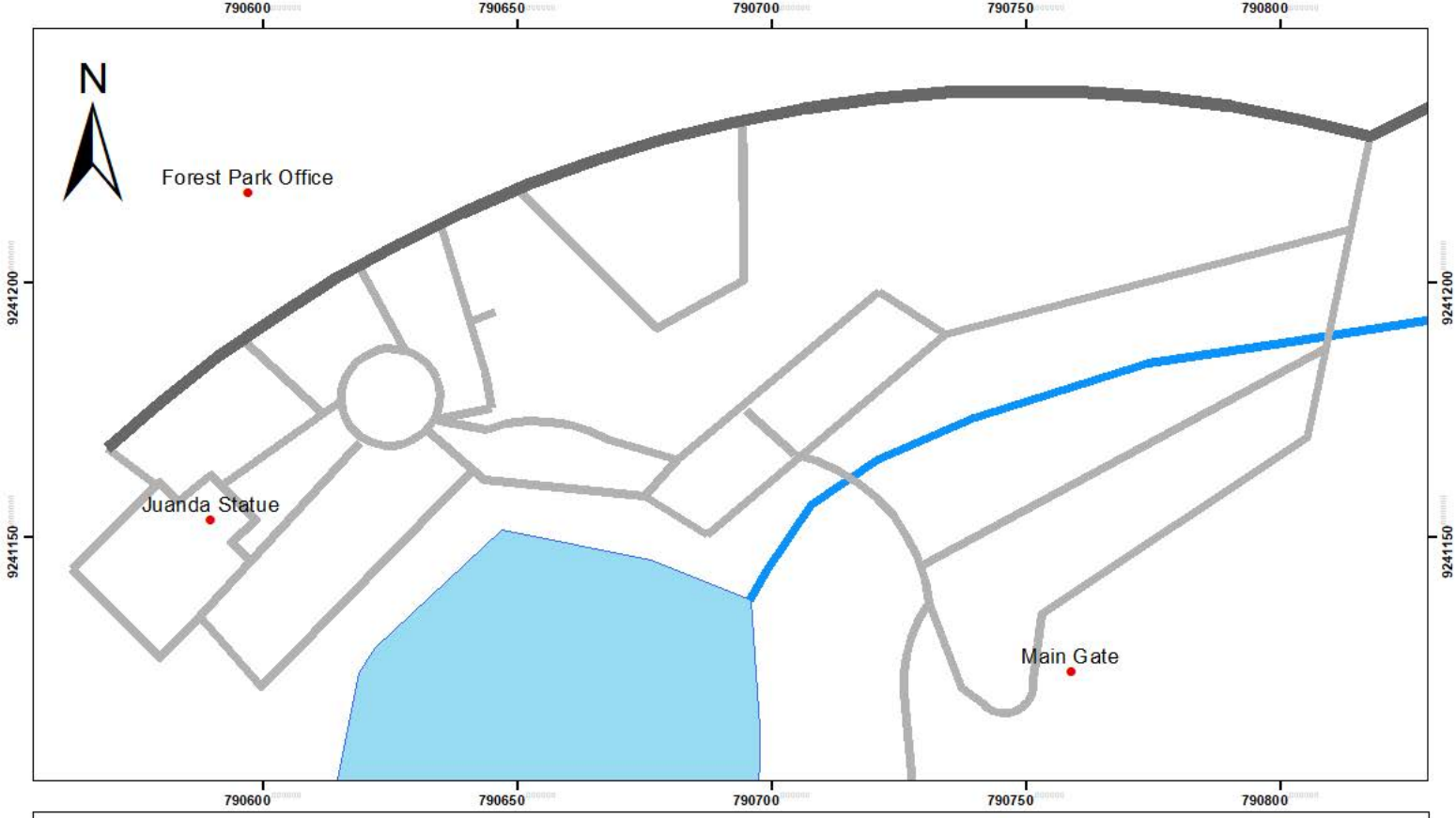
STUDENT NUMBER: 19 _ _ _ _

NO	NAME	PURPOSE	CAPACITY	CONDITION

2. On a weekly basis, an estimated number of 6,500 tourists visit Juanda Forest Park. Assume that 70 percent of them visit Juanda Forest Park on weekends (Saturday and Sunday). Based on your observations from Question Number 1, **Identify** two facilities/activities for each of tourism's 3As found in this area and **Evaluate** their capacity to accommodate the number of tourists on the weekends. [6 marks]

3As of tourism	**Answer**
Attraction	
Amenities	
Activities	

End of Question at Spot 3



MAP 3.1

STUDENT NUMBER: 19_ _ _ _

19th International Geography Olympiad

FIELDWORK EXERCISE

Task 2
Analysis Session

Student number

1	9				

Indonesia, 2023

Task 2

Analysis (22 marks)

Task Guideline

a. All tasks must be completed individually, using the answer templates provided.
b. Time allocated for this Task is **90 Minutes** for students educated in English. All other students have an extra **20 minutes**.
c. Write your answers in pen. You may use coloured pencils/pens for map work or diagrams.
d. You may refer to material in the Resource Book in your answers, and you may use material you have gathered from FWE Task 1.

1. **Public Transportation and Accessibility**

   Accessibility is one of the most important aspects for a tourism area. However, the Bukit Pakar Area (Juanda Forest Park and Bukit Pakar) is currently not connected to any public transportation. The only transportation hub is the Dago Station to the south of Bukit Pakar.

   a. Tourists usually arrive in Bandung by train at Hall Station. Imagine you are a tourist who wants to go to the Bukit Pakar Area by using public transportation (angkot). Pay attention to the public transport route map (in the resource booklet). Assume the distance to each point (interchange route, station, stop) is the same. Determine which route is the fastest and most efficient to use, and list all the stops that you must go through [1 mark]

   b. Identify and explain the best transportation mode to connect the Bukit Pakar Area and its surrounding area with Dago Terminal. [3 marks]

2. Hydrology of Bukit Pakar and its Surrounding Area

The groundwater quality of Bukit Pakar has deteriorated in the past two decades, with significant indications pointing to human intervention as the primary contributing factor.

a. From your previous field observations, identify the three main activities in Bukit Pakar area that are likely to produce waste, then categorize the resulting waste from these activities, and give examples of such waste in the table below. [3 marks]

Activity Name	**Waste Type** (Solid/Liquid/Gas)	**Waste Example**

b. Point out and explain two reasons for how the types of waste that you have mentioned earlier might affect the groundwater quality in Bukit Pakar area. [2 marks]

1st Reason	
2nd Reason	

c. Based on your observation and your answer to the previous questions, point out two strategies to restore the quality of Bukit Pakar's groundwater [2 marks]

1st Reason	
2nd Reason	

3. Sustainable Development Planning

Bukit Pakar area is facing a dilemma, on one hand it is a prospective tourism destination buoyed by a rapidly growing creative sector. On the other hand, Bukit Pakar is also a nature conservation zone with the purpose of providing essential environmental services for the Greater Bandung Area. As a geographer, you are asked to come up with a development plan to guide Bukit Pakar's development.

a. Using the resource booklet and your observation from the Field Work Exercise Task 1, list the existing problems for the development of Bukit Pakar Area according to the environmental, social, and economic aspect (two problems for each aspect). [3 marks]

Aspects	Problems
Environmental	
Social	
Economic	

b. From your previous answer, list two problems that you anticipate and the solutions that you propose for Bukit Pakar Area's future development.

Finally, propose a suitable development title to tackle those problems. [2 marks]

Problems	**Solutions**
Development Plan Name:	

c. Based on your observations and solutions for the previous question, propose four main points of interest to be developed in Bukit Pakar Area. Describe your proposed development for each point of interest and provide the reasoning for said development. Annotate these locations on Map 2A. [4 marks]

No	**Potential Development**	**Reasoning for Development**
1		
2		

No	Potential Development	Reasoning for Development
3		
4		

d. Bukit Pakar's problems are complex and interrelated; your development plan might bring benefits to some people but may negatively impact the others. Explain one positive and one negative impact of your development plan towards people in Greater Bandung Area. [2 marks]

Positive impact	
Negative impact	

19th International Geography Olympiad

FIELDWORK EXERCISE

Resource Booklet

Indonesia, 2023

The Dilemma of Cimenyan as a Conservation Zone

Bukit Pakar is located in Cimenyan District, part of Bandung Regency and also part of the Greater Bandung Area. Cimenyan is designated as a conservation and groundwater recharge zone to preserve the environmental sustainability of the whole Bandung Area. The area provides essential environmental services, such as fresh water and clean air, and also helps protect the Greater Bandung Area from natural disasters such as flooding and mass movements.

To ensure sustainable development in the area, there are several limitations in developing Cimenyan District, such as the prohibition of constructing heavy and/or polluting industries, changing forest land use, conserving biodiversity, and prohibition of building near sources of water such as lakes, rivers, and water springs, or areas with steep slopes (over 40% inclination).

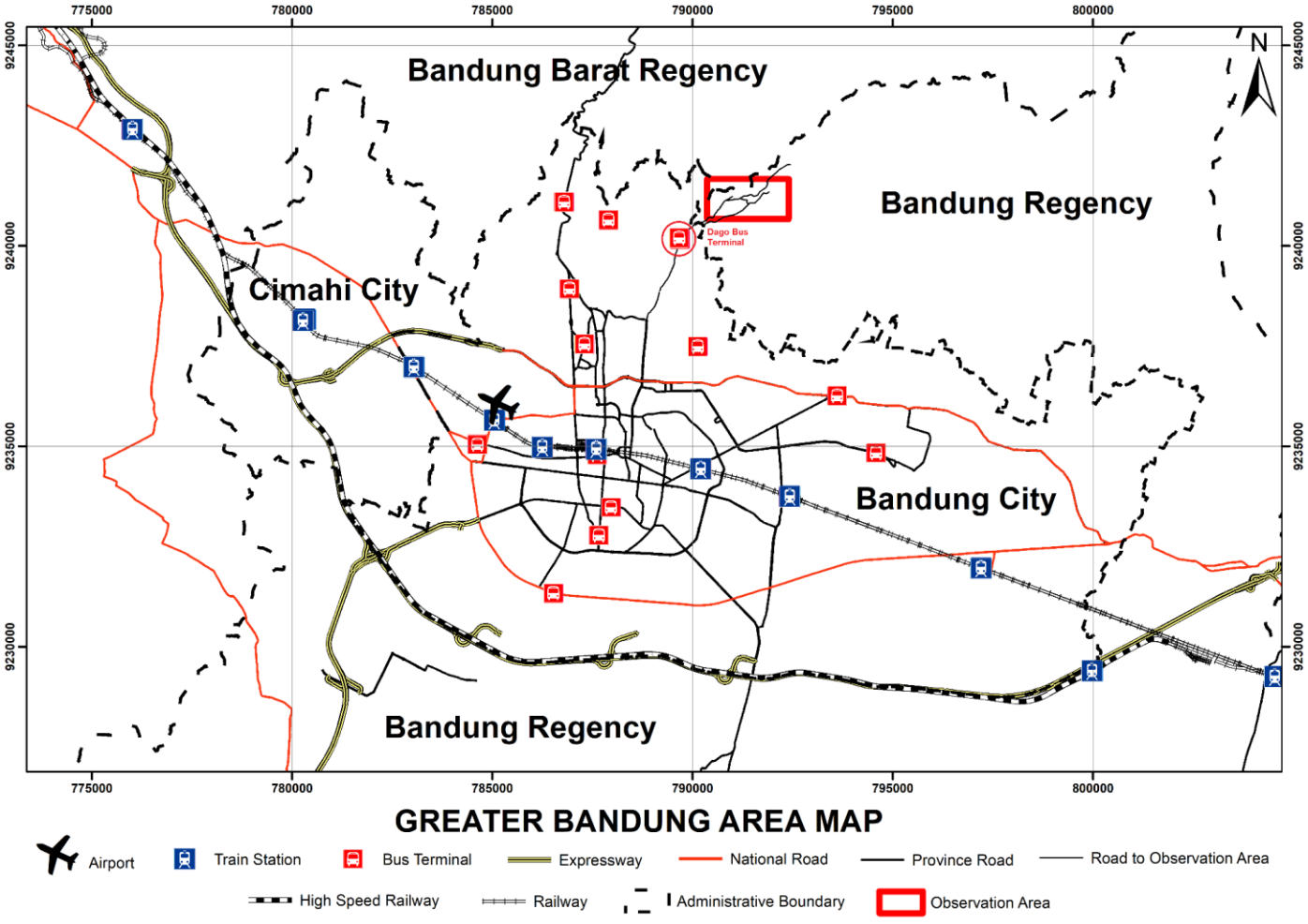


Figure 1. Cimenyan and Bukit Pakar in the Greater Bandung Area

Source: Processed using data from OpenStreetMap and Geospatial Information Agency, 2021

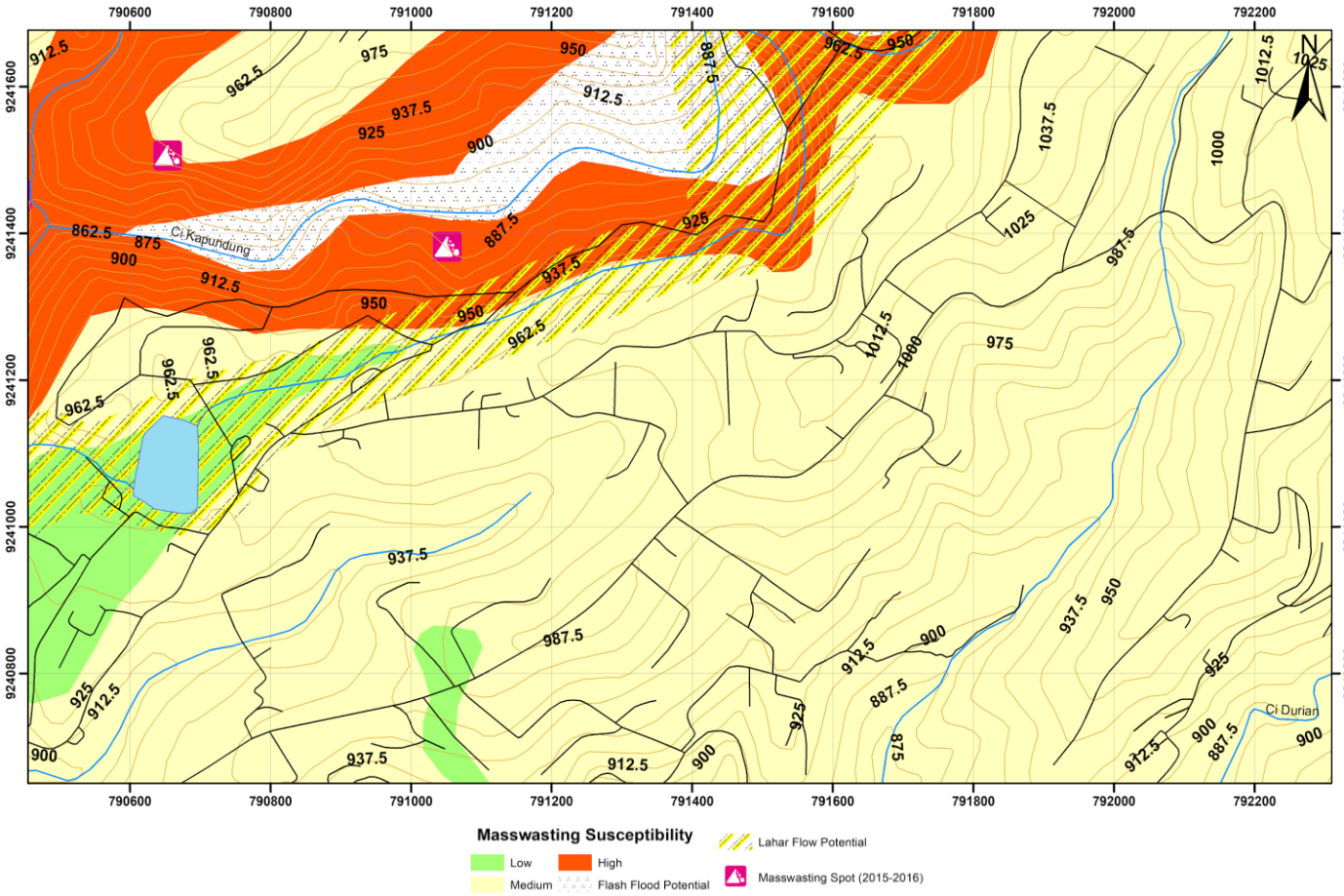


Figure 2. Disaster Susceptibility Zones in Bukit Pakar

Source: Geological Bureau, Ministry of Energy and Mineral Resources, 2019

However, Cimenyan is also facing a dilemma of its own. Since the early 2000s, many people have settled in Cimenyan due to its proximity to Bandung and other centers of growth in the Greater Bandung Area. The rapid population growth coupled with a growing productive age population and the need to lift them out of poverty has forced the local government to develop Cimenyan District instead of keeping it as a conservation zone. Due to its fertile soil and decent rainfall, the local government has developed Cimenyan as an agricultural center, replacing its tropical forests with the now iconic hill farms. Now, Cimenyan has become one of the main vegetable-producing centers in Greater Bandung supplying Bandung City and Bandung Regency.

Table 1. Population Growth of Bandung and Cimenyan

Areas	2017	2018	2019	2020	2021
Cimenyan	119,360	121,304	123,196	114,567	115,626
Bandung Regency	3,657,701	3,717,291	3,775,279	3,623,790	3,666,156
Bandung City	2,497,938	2,503,708	2,507,888	2,510,103	2,527,854

Source: Indonesian Statistical Agency, 2022

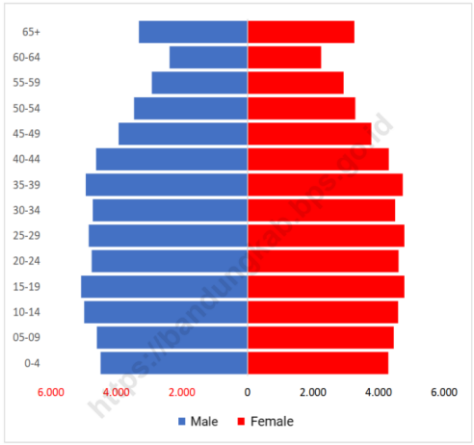


Figure 3. Population Structure of Cimenyan in 2021

Source: Indonesian Statistical Agency, 2022

This rapid development has successfully boosted the local economy and lifted many out of poverty. However, this has caused a disturbance in the local ecoregion which greatly impacted the surrounding areas. There has been a significant increase in flooding, tripling from 12 floods in 2012 to 50 in 2021. Besides flooding, significant development in Northern Bandung, especially around Cimenyan has caused widespread water pollution due to massive industrial and household waste that is dumped into the surrounding environment.

Creative Sector in Bukit Pakar as an Engine of Growth

Figure 4. Creative Sector in Bukit Pakar

Source: Multiple local news agencies

Note: Clockwise from top-left to bottom left: Selasar Sunaryo Artspace, Wot Batu Sculpture Park, Fashionable Restaurants, and Hillside Cafes.

Bukit Pakar's creative sector is expected to be an engine of growth that is friendly to the environment. To kickstart the development, the government has transformed Juanda Forest Park into a conservation center that can double as a limited tourism spot. It has attracted campers, joggers, and even students wanting to learn more about nature and conservation. The private sector has also constructed many restaurants and art spaces near

Juanda Forest Park and along the Bukit Pakar area overlooking Bandung City. There is also a lively community of cyclers and art students from nearby universities congregating in the hillside cafes and restaurants on the weekends.

Figure 5. Interesting Spots in Bukit Pakar

Source: Multiple local news agencies

Note: Clockwise from top-left to bottom left: Scenic views, undulating hills, street vendors, and lush forests of the Juanda Forest Park.

These developments build upon Bukit Pakar's clean air, lush vegetation, and scenic views of the surrounding area to create a unique value proposition to attract many kinds of tourists. Even though the majority of its visitors are locals looking to relax and unwind, Bukit Pakar has something to offer for everyone, even thrill-seeking mountain bikers and runners are accommodated. Several spots are very popular for street vendors specifically serving these types of tourists, these are frequently located in intersections and junctions with high accessibility and are directly on the path of the morning ride routes of several running and cycling communities in Northern Bandung.

Development Challenges in Bukit Pakar

Figure 6. Angkot as a Public Transport Mode

Source: Multiple local news agencies

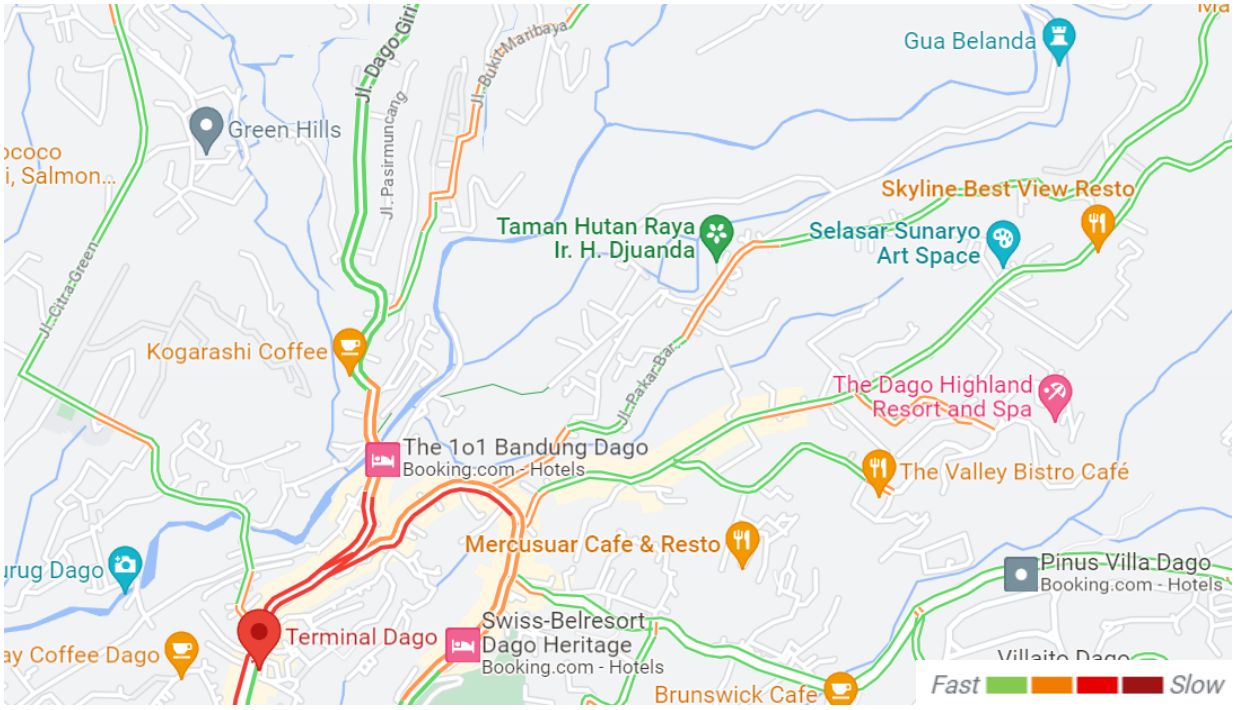


Figure 7. Average Traffic Speed of Bukit Pakar and Surrounding Areas

Source: Google Maps, 2023

Bandung's premier public transport is the Angkot which functions similarly to a bus rapid transit, but at a smaller scale using regular vehicles instead of buses. Bandung also has a BRT system in the form of Trans Metro Bandung that uses large buses, however, the system is still much smaller compared to the Angkot. Currently, Bukit Pakar is not served by any form of public transportation. The closest available transit station is Terminal Dago (dago station) to the southwest. This forces tourists and locals visiting the area to use their private vehicles, causing frequent traffic jams and widespread air pollution in Bukit Pakar.

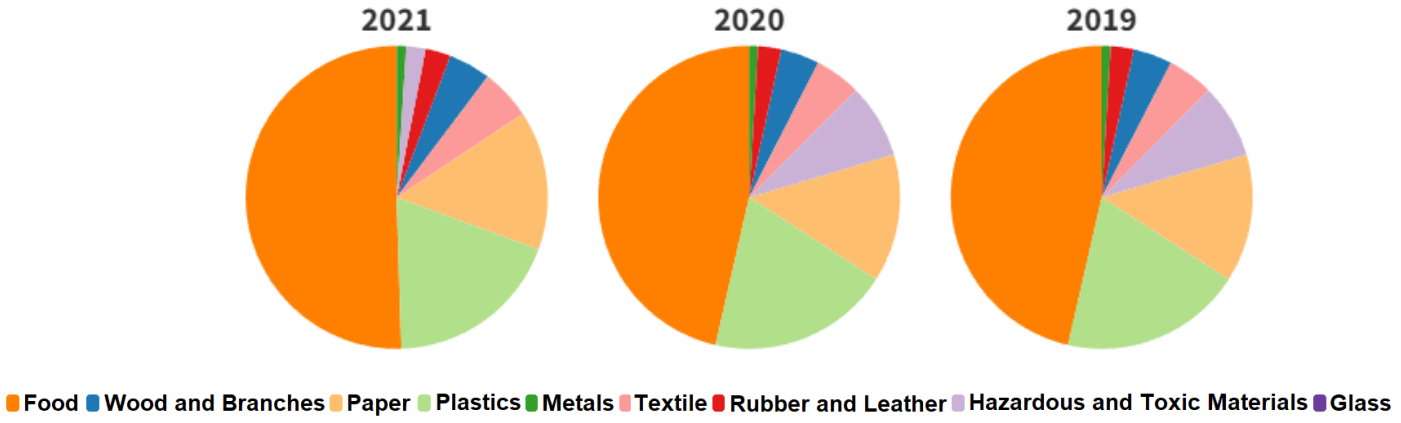


Figure 8. Estimated Composition of Bandung Regency's Waste

Source: Bandung Regency Government, 2022

Another problem is pollution, Bukit Pakar's trash disposal capacity can't keep up with the amount of waste produced, which is roughly twice the current processing capacity. The lack of trash storage and processing facilities in Bukit Pakar is thought to be one of the main causes of public littering and widespread pollution of the surrounding ecosystem. Another reason for the environmental degradation would be the heavy pollution in the Cikapundung River due to the industries upstream in the Bandung Regency.

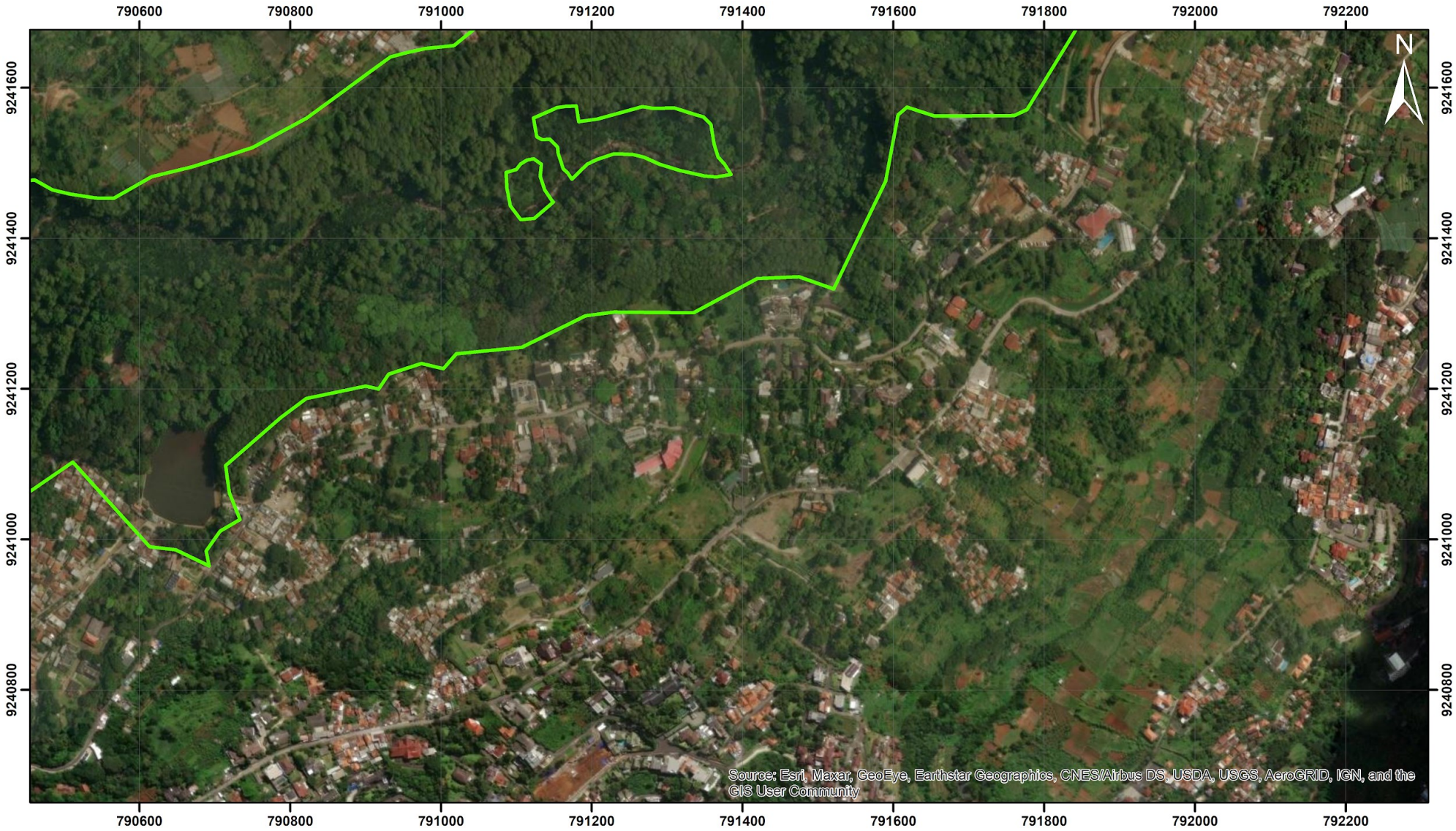


Figure 9. Satellite Image Map of Bukit Pakar Area

Source: ESRI, 2023

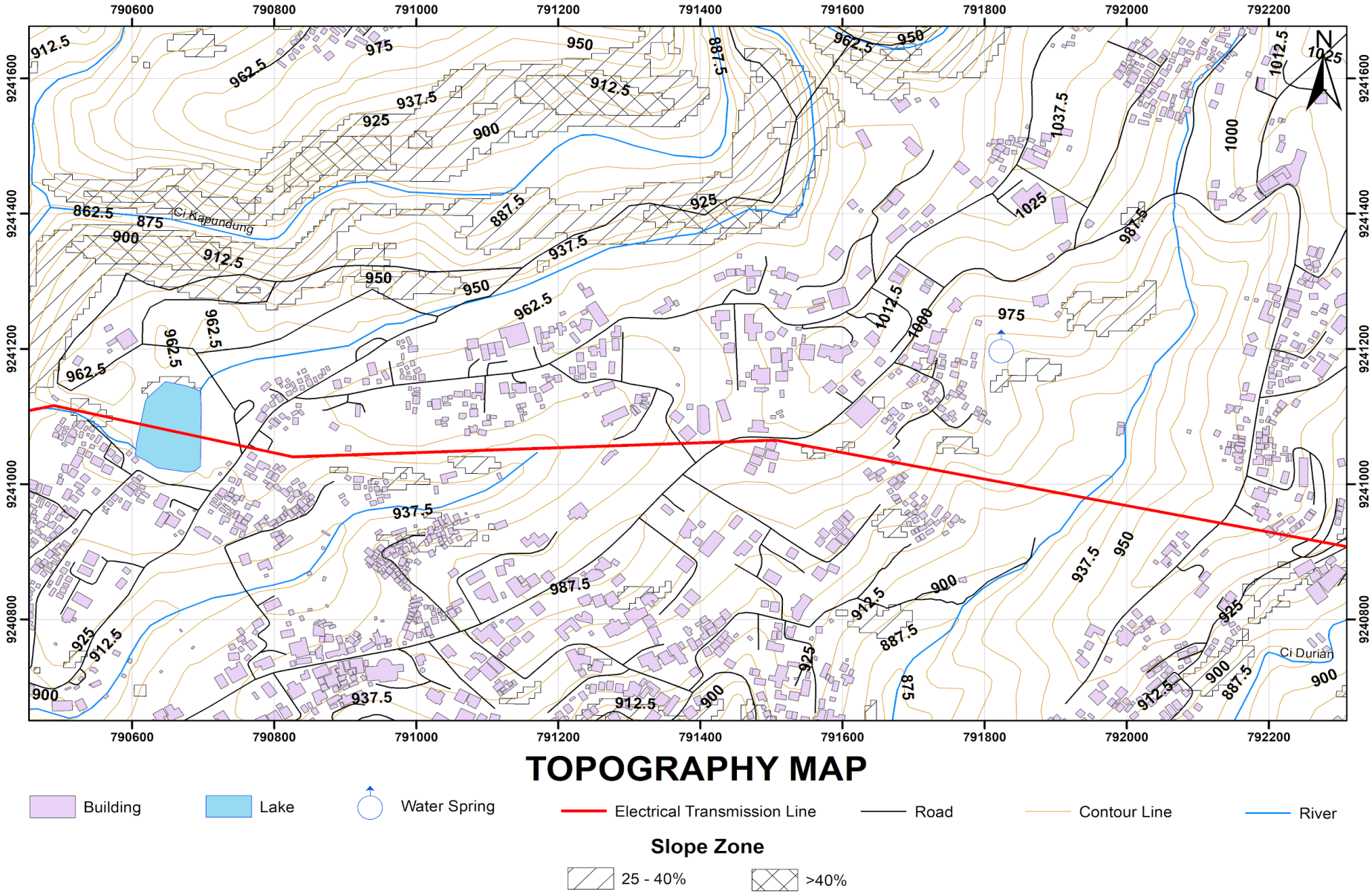


Figure 10. Physical Condition of Bukit Pakar Area

Source: Processed using data from Bandung Municipal Government and Geospatial Information Agency, 2023

Figure 11. Angkot Route in Bandung City and Bandung Regency

Source: Processed using data from YourBandung, 2015