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DISCONTINUITIES STUDY AND ROCK SLOPES STABILITY ANALYSIS FOR ROCK MASS AT DAMANSARA AREA, P.JAYA



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Scope Discuss

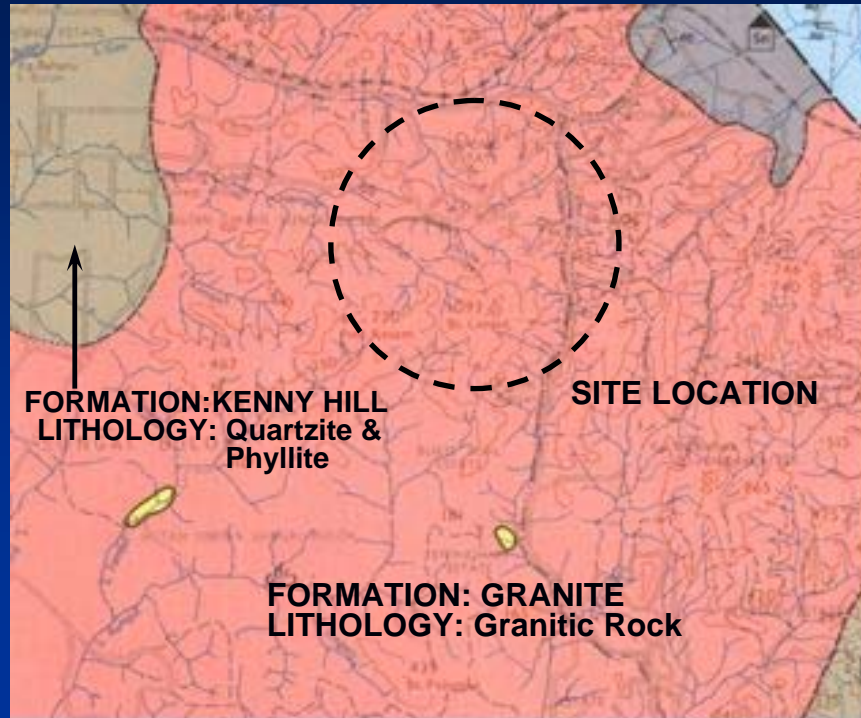
- Introduction
- Geology of the site
- Method of Study
- Result of Study
- Potential Hazards & Mitigation Measures
- Discussion & Conclusion



Introduction

- Study area: 5 areas in Damansara area
- Some of the sites are located at the road side while the others are in housing area
- Most of the sites were secondary forest previously

Geology of the Site



- The site is underlain by KL Granite
- Weathering profile: Grade II to VI
- Granite rocks are whitish grey and dark grey in colour with iron stained markings
- **Chemical weathering** is the main character for the weathering process
- Exposed rock is generally Grade II and III



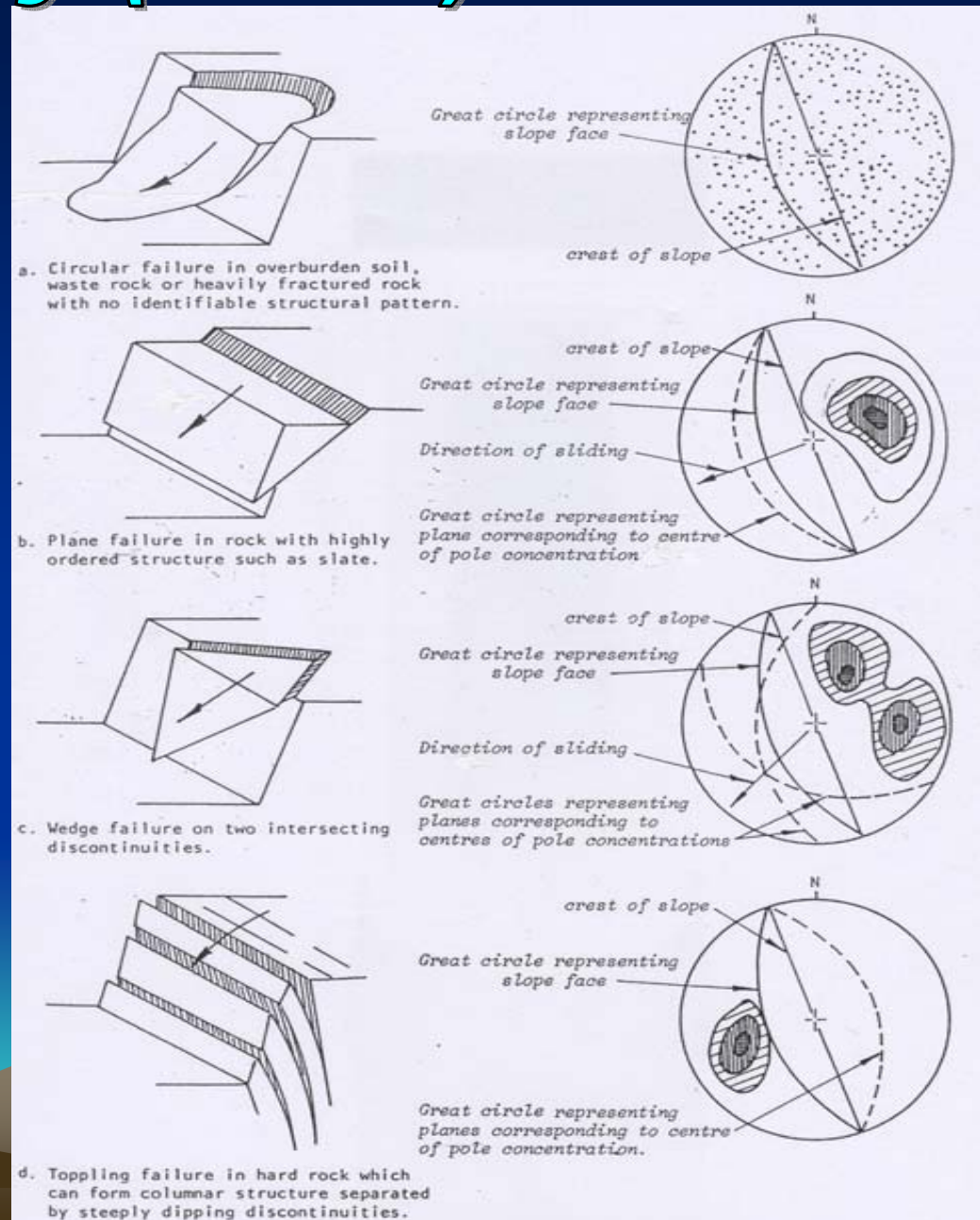
Method of Study

- Systematic data collection and presentation
- Geological mapping using 'Line Mapping' method
- Walkover survey along the rock slope before collecting data
- Photographs for documentation and identify the potential failure mode during analysis and design stage
- Skylift was used to access to the upper part of some high rock slopes



Method of Study (Cont')

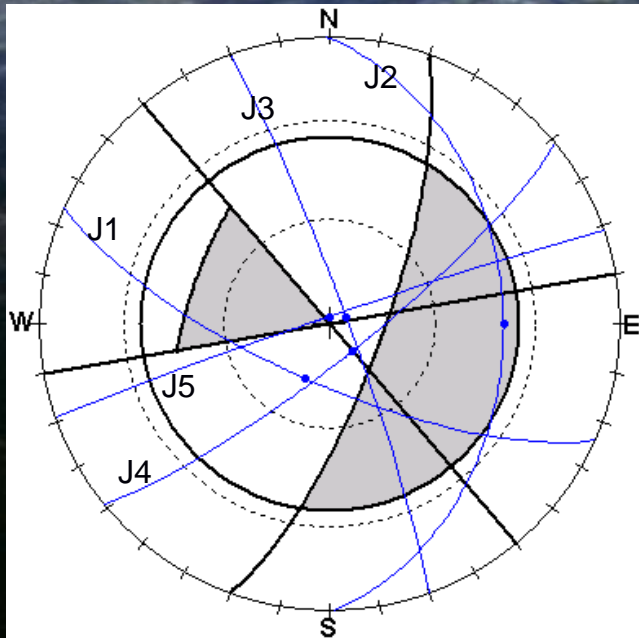
- Determination of possibility of slope instability from the orientation of the discontinuities - **Kinematic Analysis**
- This determination is accomplished by stereoplots analysis
- 4 types of typical failure modes, namely circular failure, plane failure, wedge failure and toppling failure



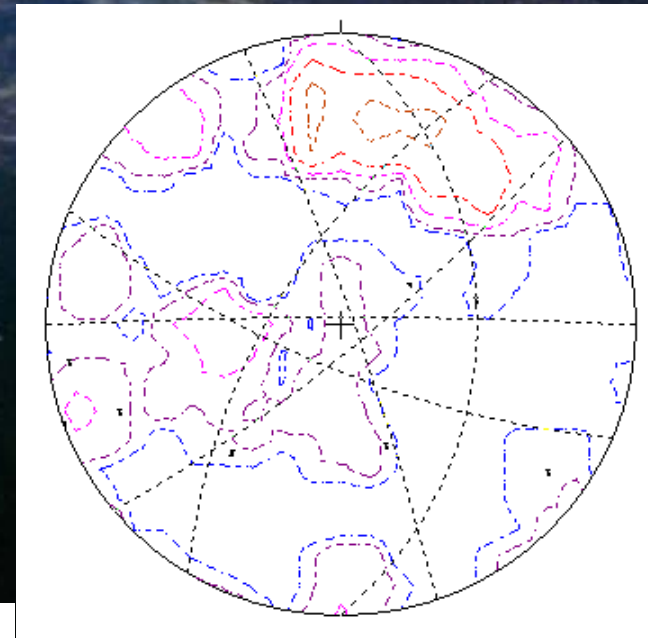
Results of Study

Zone A

- Located at the northeast part of the Damansara Hill
- Major Discontinuities: J1 (203/73), J2 (090/40), J3 (071/85), J4 (140/80) and J5 (360/88)
- Potential Wedge Failure: J1 & J2, J2 & J4, J2 & J5
- Potential Plane Failure: J2



a) Zone A



Zone B

This zone has been divided into Zone B1 and B2.

Zone B1 was located at the highest part of the Damansara Hill

Major joints: **J1 (210/70)**, J2 (110/85), J3 (300/26), J4 (310/85)

Potential Wedge **Failure**: J1 & J2

Potential Toppling Failure: J4

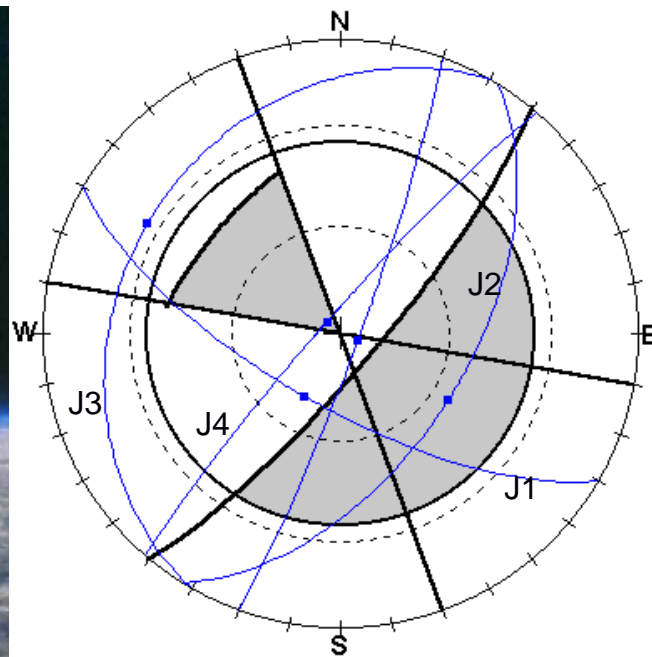
Zone B2 located at the southern part of the study area.

Three possible failure identified are circular, plane and wedge failure from the three major discontinuities of J1 (215/77), J2 (136/77, and J3 (305/30)

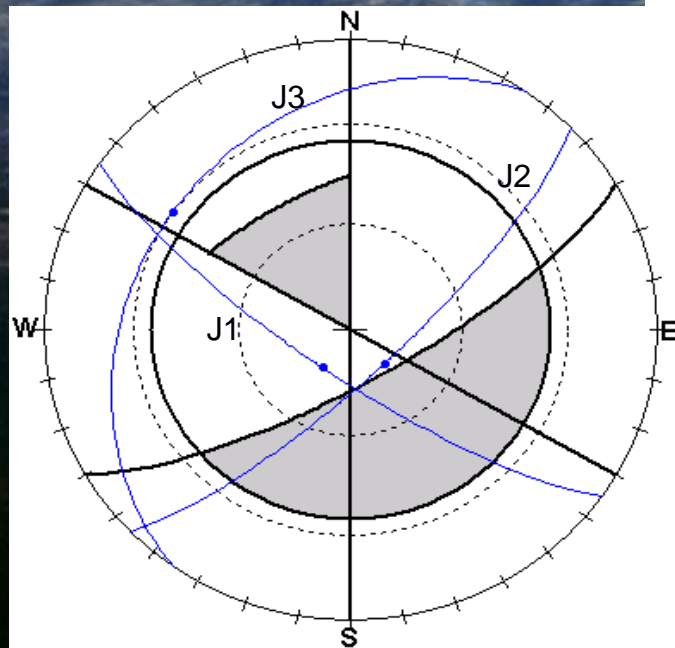
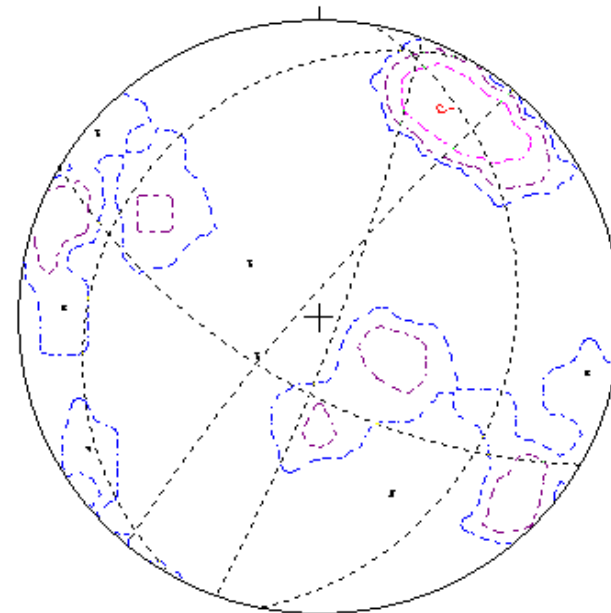
Analysis on the pole plot shows that the discontinuities data scattered randomly - **possibility of circular failure**

Potential Wedge Failure: J1 & J2

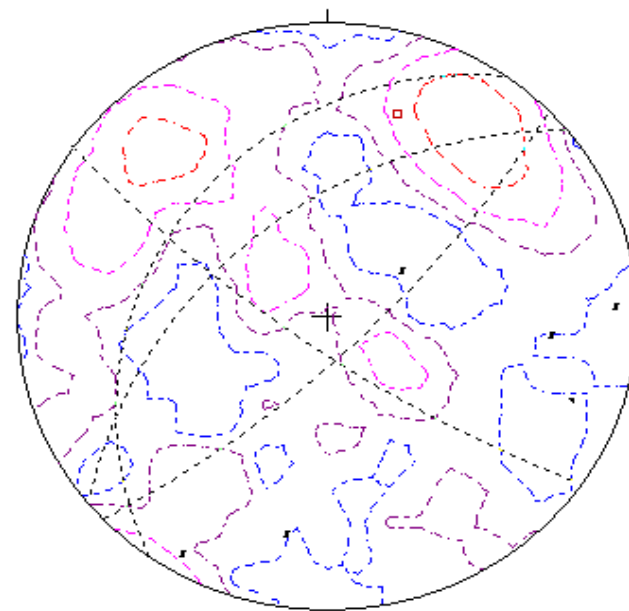
Potential Plane Failure: J1



b) Zone B1



c) Zone B2



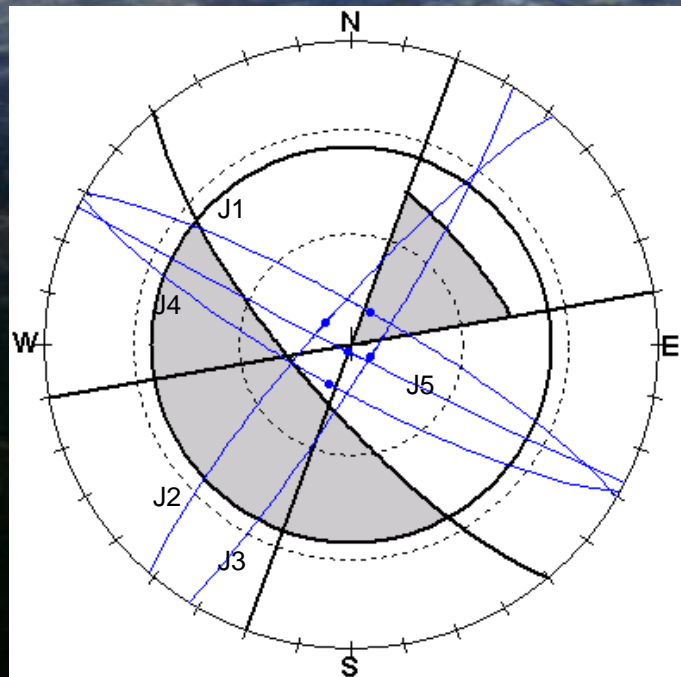
Zone C

Zone C is located at the Damansara business centre area at the southern part of the Damansara hill.

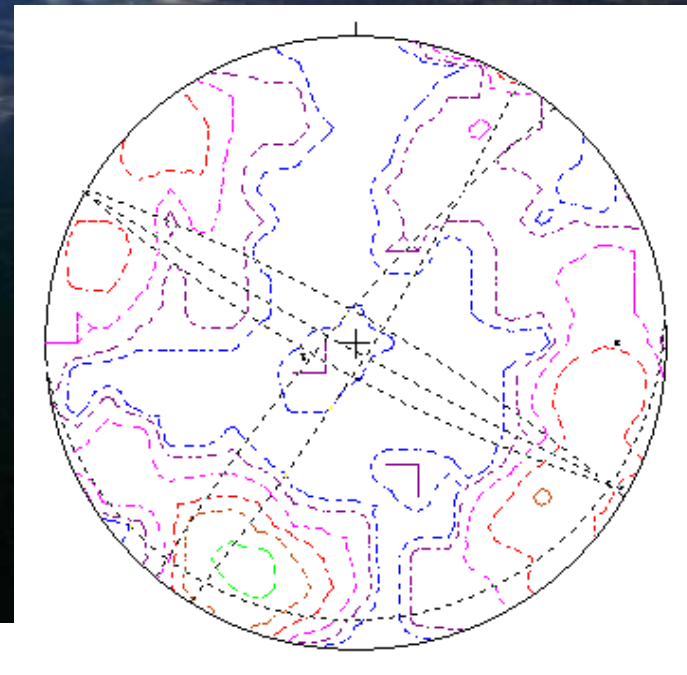
Major discontinuities: J1 (030/80), J2 (310/81), J3 (122/84), J4 (209/88) and J5 (209/78)

Potential Wedge Failure: J2 & J4

Potential Toppling Failure: J1

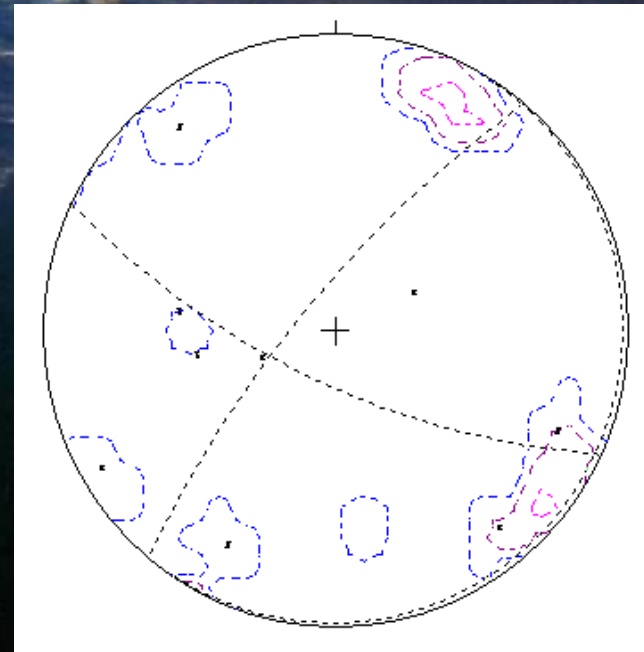
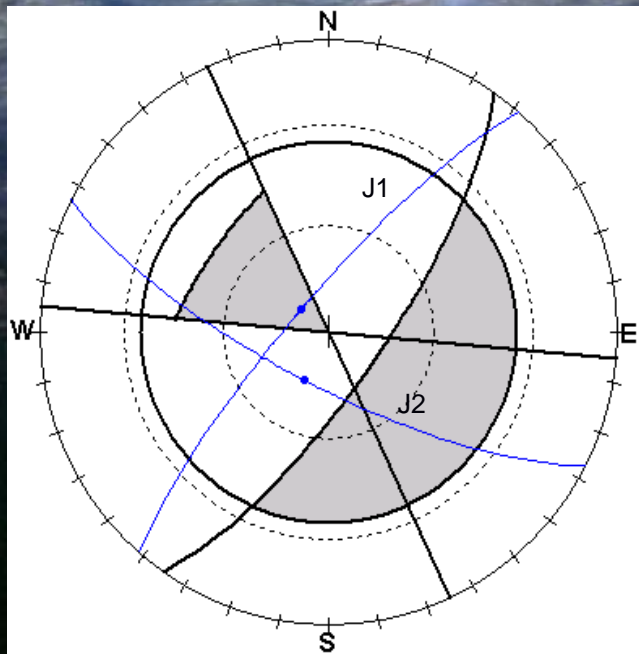


a) Zone C



Zone D

Zone D is located at the northwest part of the study area
Major discontinuities: J1 (310/80), J2 (208/75),
Potential Toppling Failure: J1



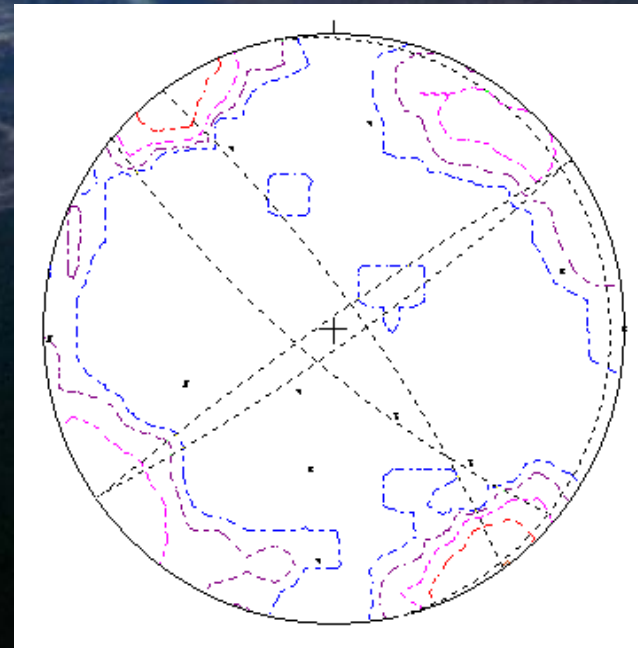
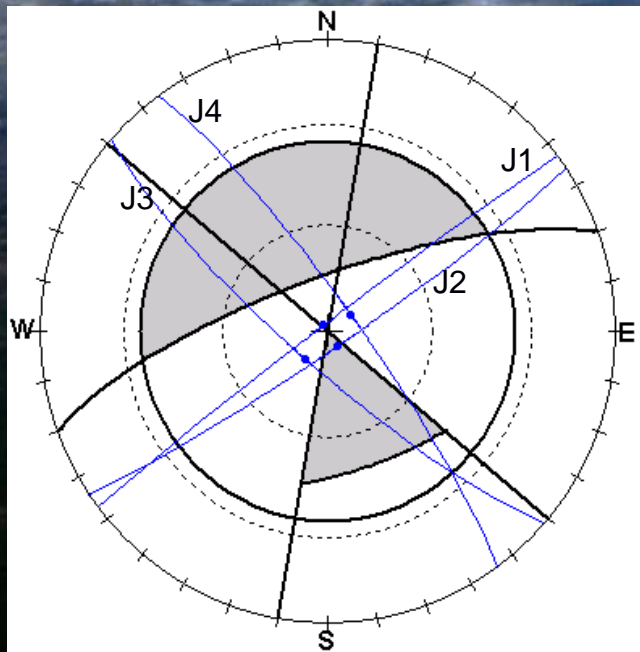
b) Zone D

Zone E

Zone E located far to the Northeast part of the Damansara area.

Major discontinuities: J1 (325/88), J2 (145/85), J3 (220/80), J4 (054/82)

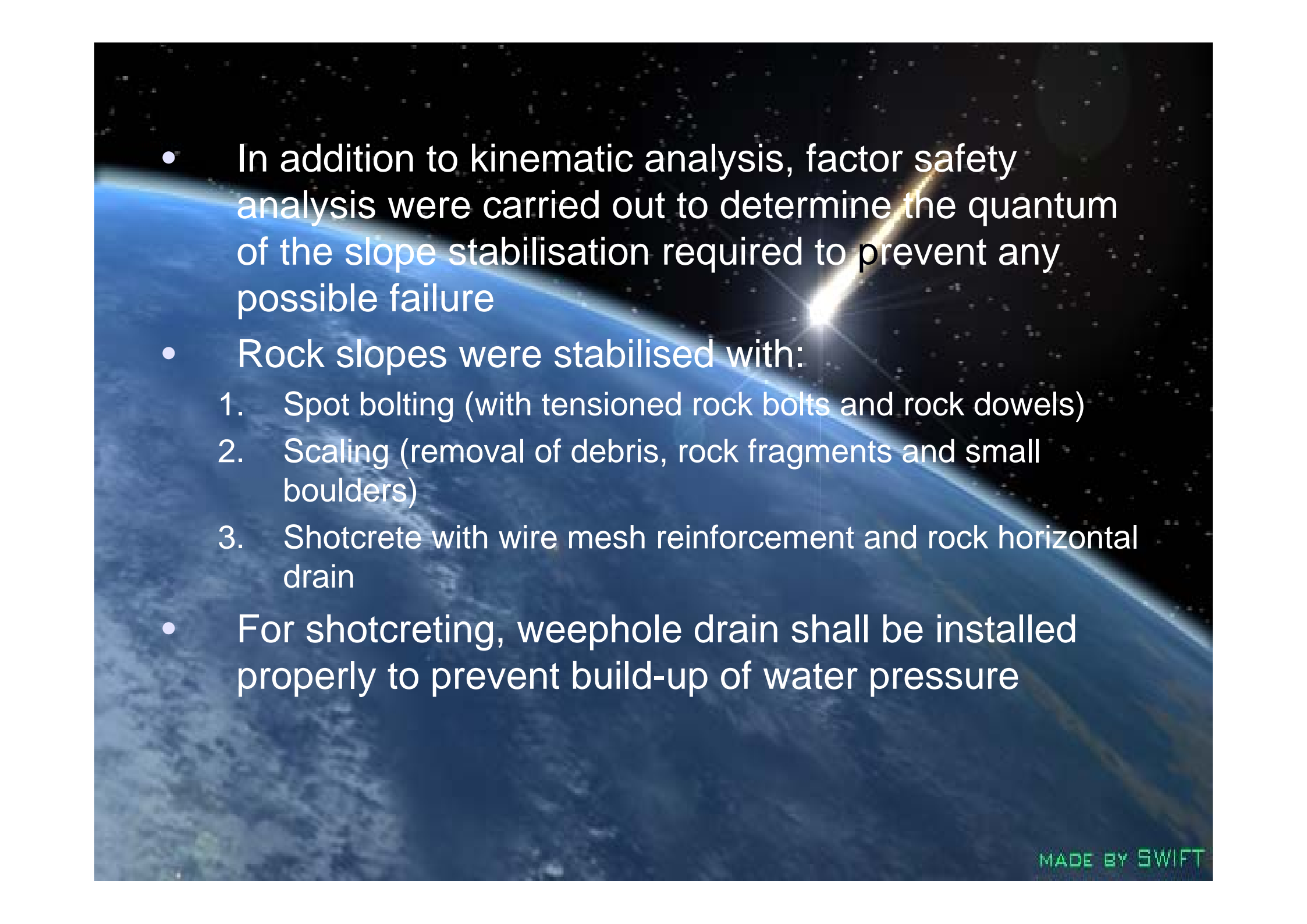
Potential **Toppling Failure**: J2



c) Zone E

Potential Hazards & Mitigation Measures

- Development of hilly terrain involves site clearing and removal of trees
- **Slope erosion** and **landslide** are the primary concerns of the environment impacts
- Falling of loose boulders or rock fragments, sliding of unstable blocks and rockfalls could also occur at exposed or blasted rock slopes.

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- In addition to kinematic analysis, factor safety analysis were carried out to determine the quantum of the slope stabilisation required to prevent any possible failure
 - Rock slopes were stabilised with:
 1. Spot bolting (with tensioned rock bolts and rock dowels)
 2. Scaling (removal of debris, rock fragments and small boulders)
 3. Shotcrete with wire mesh reinforcement and rock horizontal drain
 - For shotcreting, weephole drain shall be installed properly to prevent build-up of water pressure

Completed Stabilisation Measures

Zone A Rock Slope

BEFORE



AFTER



Zone C Rock Slope



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Zone E Rock Slope



BEFORE



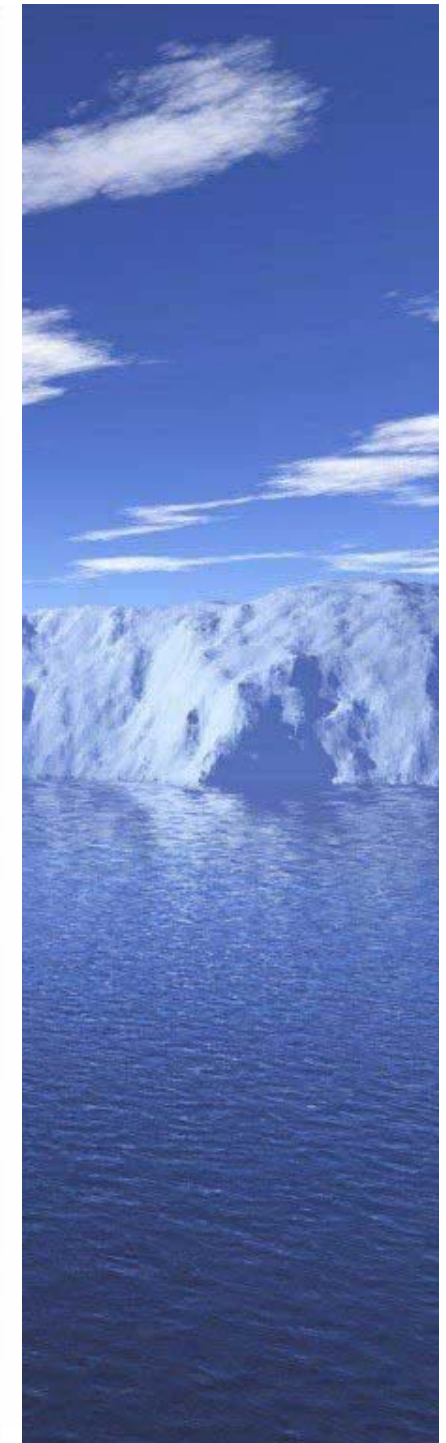
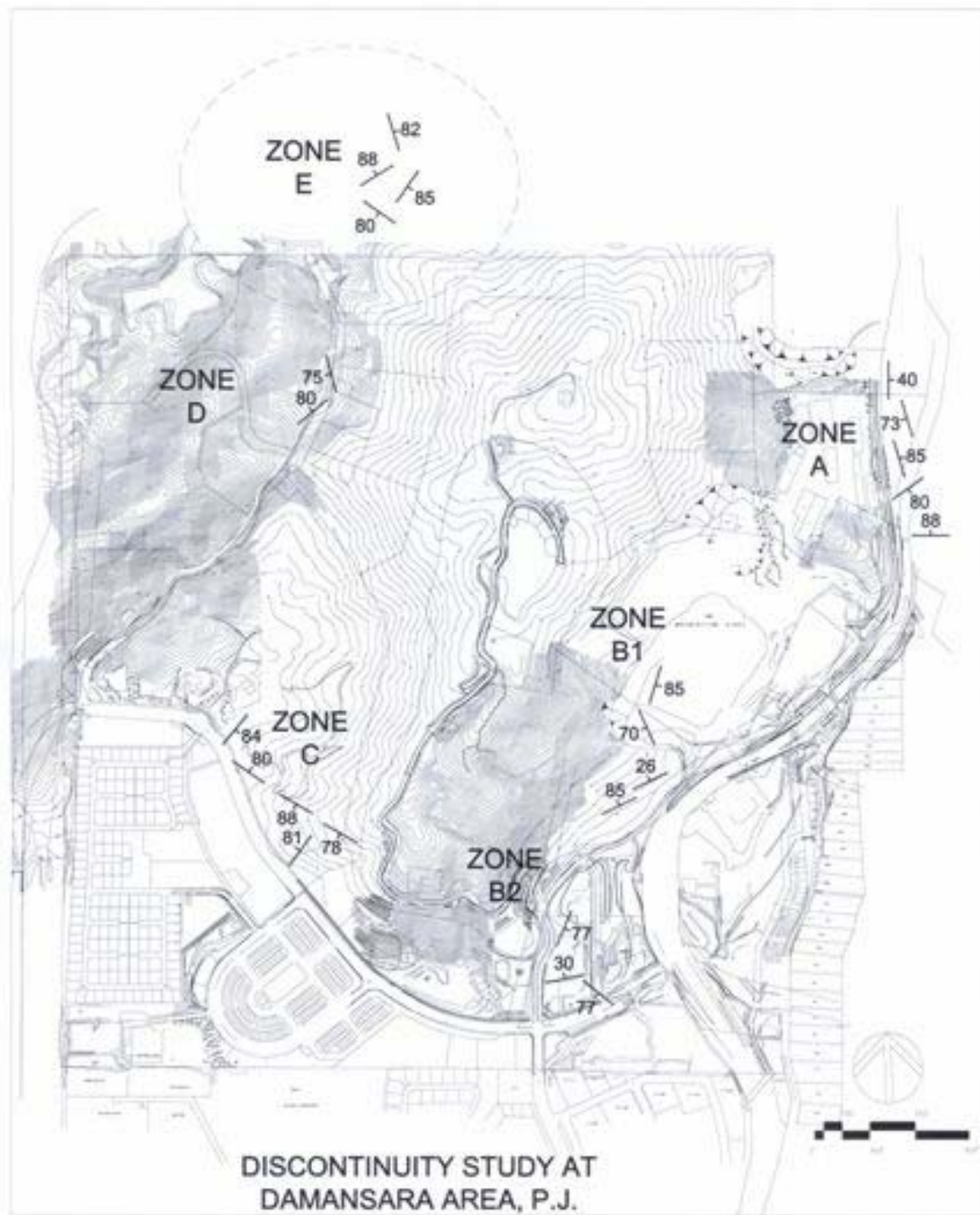
AFTER



Discussion & Conclusion

- From the kinematic analysis, possible failure modes consists of circular, plane, wedge and toppling failures for rock slopes under this study
- Two common trends of discontinuities can be observed at each zone, which are discontinuities plane of 300° - 310° with dip of 80° - 85° and 200° - 210° with dip of 70° - 80°
- This suggests **presence of relatively homogenous trends of discontinuities of Granite hill at Damansara area**
- More detailed kinematic and safety factor analyses are required to identify localised unstable blocks and suitable slope stabilisation measure



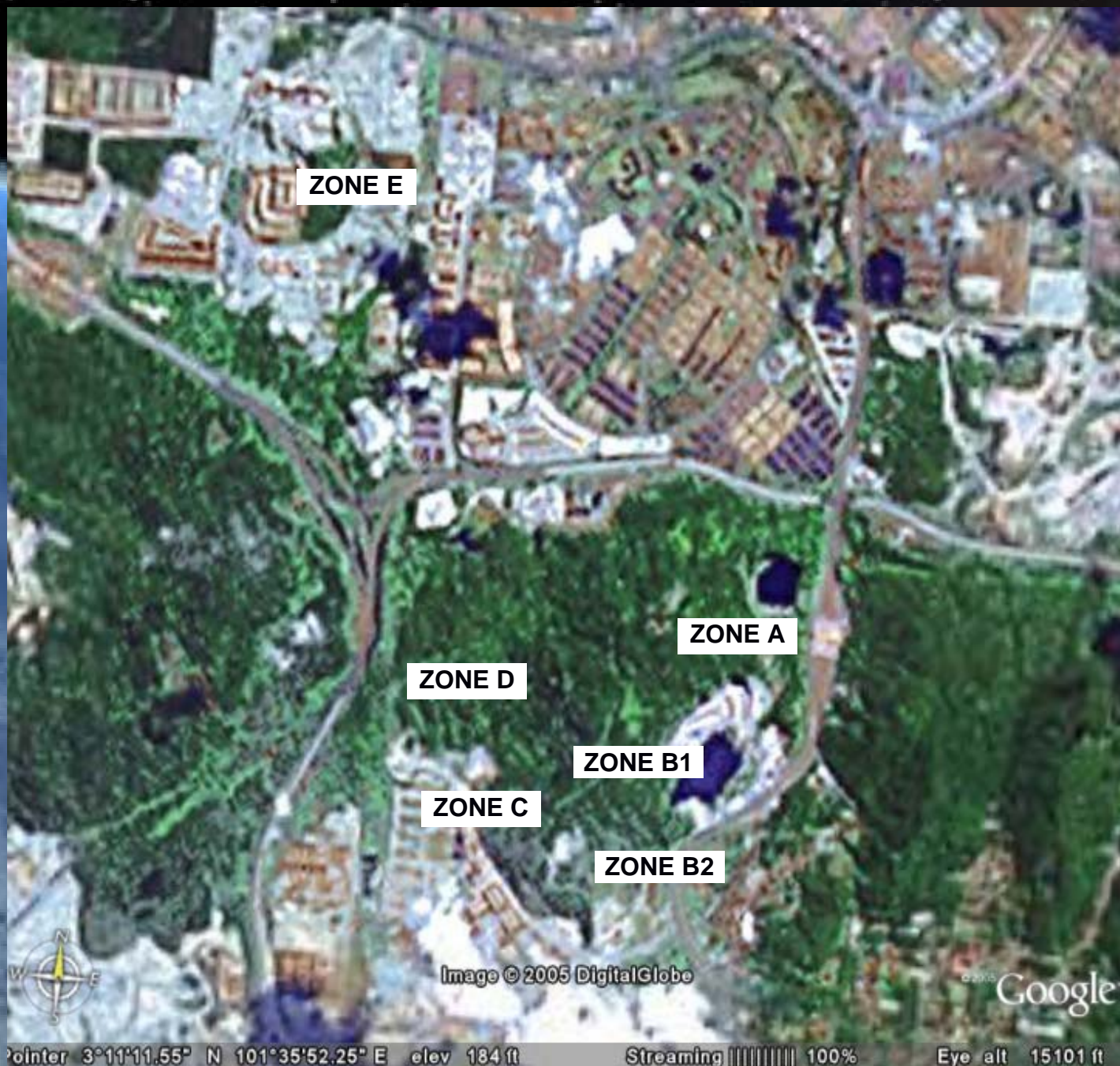


Area	Zone A	Zone B1	Zone B2	Zone C	Zone D	Zone E
Slope Face Orientation	110°/ 75°	130°/ 80°	150°/ 75°	230°/ 75°	125°/ 70°	340°/ 75°
Major Discontinuities	J1– 203°/73° J2– 090°/40° J3– 071°/85° J4– 140°/80° J5– 360°/88°	J1– 210°/70° J2– 110°/85° J3– 300°/26° J4– 310°/85°	J1– 215°/77° J2– 136°/77° J3– 305°/30°	J1– 030°/80° J2– 310°/81° J3– 122°/84° J4– 209°/88° J5– 209°/78°	J1– 310°/80° J2– 208°/75°	J1– 325°/88° J2– 145°/85° J3– 220°/80° J4– 054°/82°
Potential Failure Mode	Wedge/ Plane	Wedge	Wedge/ Plane/ Circular	Wedge/ Toppling	Toppling	Toppling
Mitigation measure	Completed Rock bolt Rock dowel Shotcrete HD	Proposing	Completed Rock bolt Rock dowel Shotcrete HD	Completed Rock bolt Rock dowel Shotcrete HD	On-going Rock bolt Rock dowel Shotcrete HD	Completed Rock bolt Rock dowel Shotcrete HD

Table 1: Summary of rock slope condition

* HD- Rock horizontal drain





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The background is a dark, monochromatic abstract composition. A large, transparent sphere with a complex wireframe of intersecting lines is the central focus. Two bright, star-like light sources are positioned on the sphere's surface, one near the top and one near the bottom left. Below the main sphere, a cluster of smaller, similar wireframe spheres is visible. The overall aesthetic is futuristic and technological.

Question and Answer

I take a look at the sky I can't see a thing

Thank You !

Cold Clouded Misery