

# Former CSR Quarry Hornsby & Associated Lands



Pells Sullivan Meynink Pty Ltd

# ENGINEERS AUSTRALIA



## CODE OF ETHICS

All members of the Institution of Engineers, Australia, in the practice of the discipline of engineering, are committed and obliged to apply and uphold the Cardinal Principles of the Code of Ethics, which are:

- to respect the inherent dignity of the individual,
- to act on the basis of a well informed conscience, and
- to act in the interest of the community.

Further :

*Members shall place their responsibility for the welfare, health and safety of the community before their responsibility to sectional or private interests, or to other members.*

# Former CSR Quarry Hornsby & Associated Lands

## AIM

- Recent media attention on the quarry has raised the perception that the lives of residents around the quarry are at risk due to potential landslides in the quarry.
- What we would like to do today is:
  - present some of the background about the quarry,
  - discuss the stability of the quarry walls, and
  - answer questions about the risk of living around the quarry.

# Former CSR Quarry Hornsby & Associated Lands

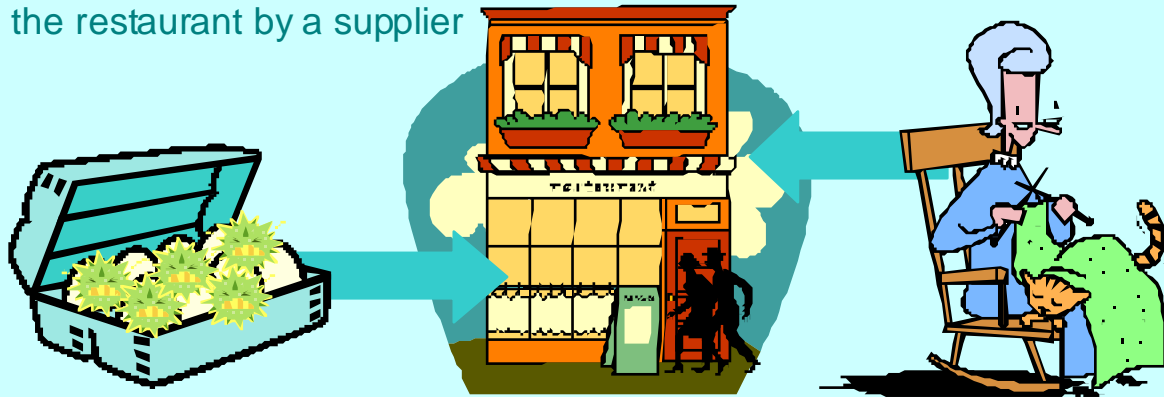
## PRESENTATION

- How the quarry was formed.
- What the ground profile in the quarry and below the surrounding houses looks like.
- Stability of the quarry faces and ground below houses.
- Likelihood that a landslide affecting the houses may occur.
- Risk – What it means and how it varies from the likelihood of failure.





Eggs are delivered daily to the restaurant by a supplier



Unfortunately, on one day, once in 10 years all the eggs delivered are contaminated with salmonella ...

The chance of this happening on any one day equates to 1/10 or **0.1**.

Grandma doesn't get out too often. Once every five years she eats eggs at the restaurant.

The annual probability of Grandma visiting the restaurant equates to 1/5 or **0.2**.



How many people die from salmonella poisoning? 1 in 1000?

The chance of death from salmonella poisoning equates to 1/1000 or **0.001**.

? So, what is the probability of Grandma dying from salmonella poisoning because she goes to the restaurant? ?

0.1                      x                      0.2                      x                      0.001

**RISK OF DEATH = 0.00002 or 2 in 100,000**

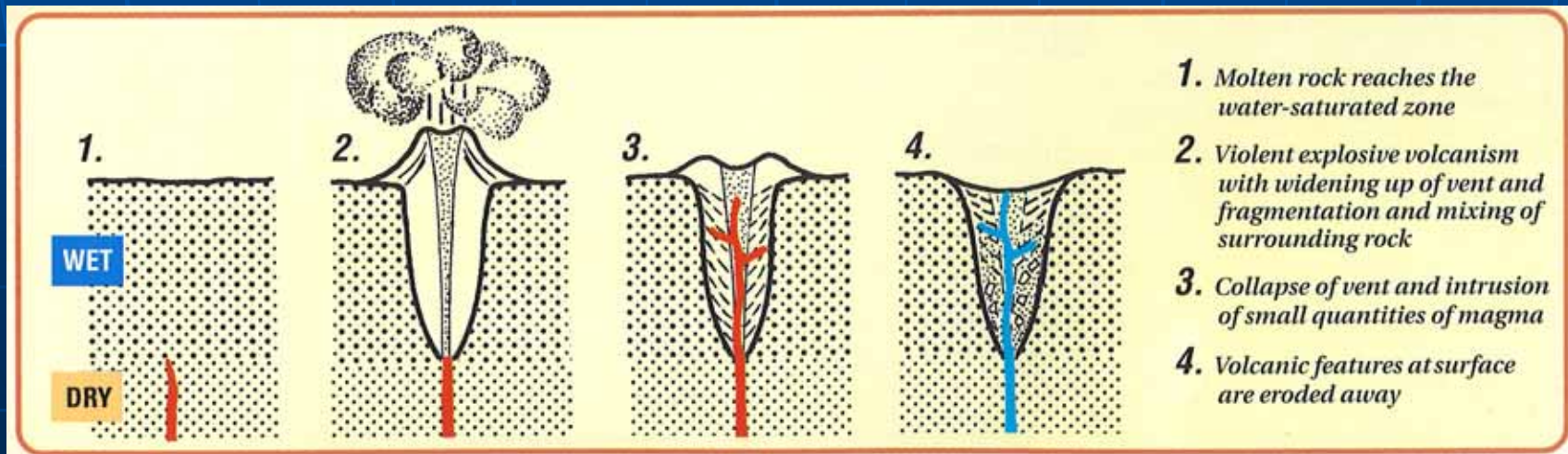
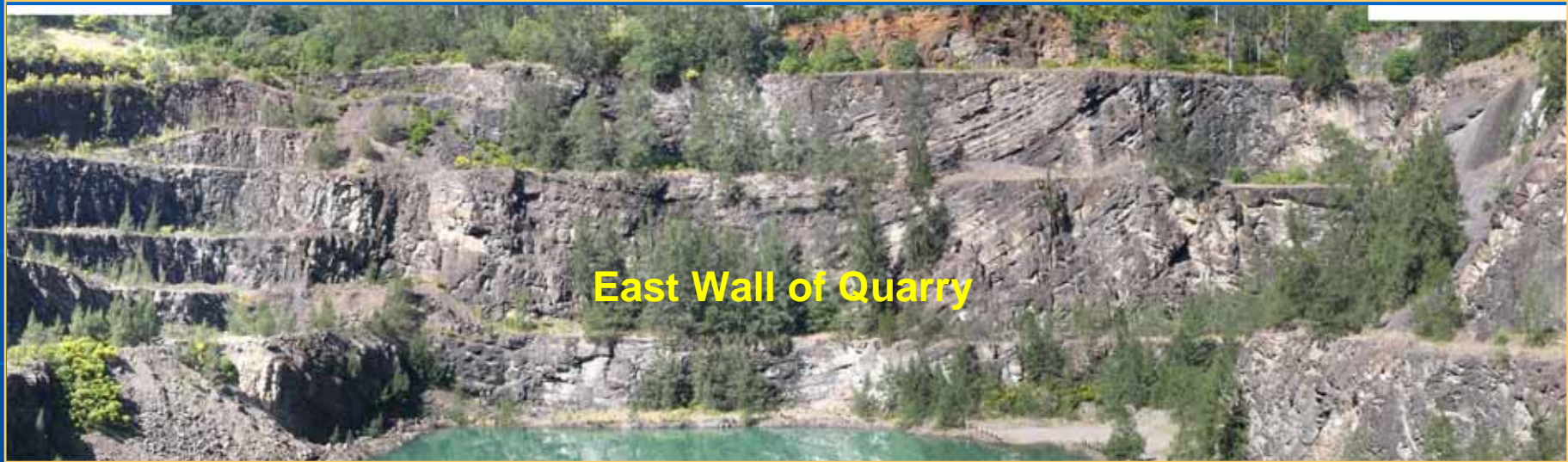
i.e. if 100,000 people go to restaurant annually, 2 may die in a year.

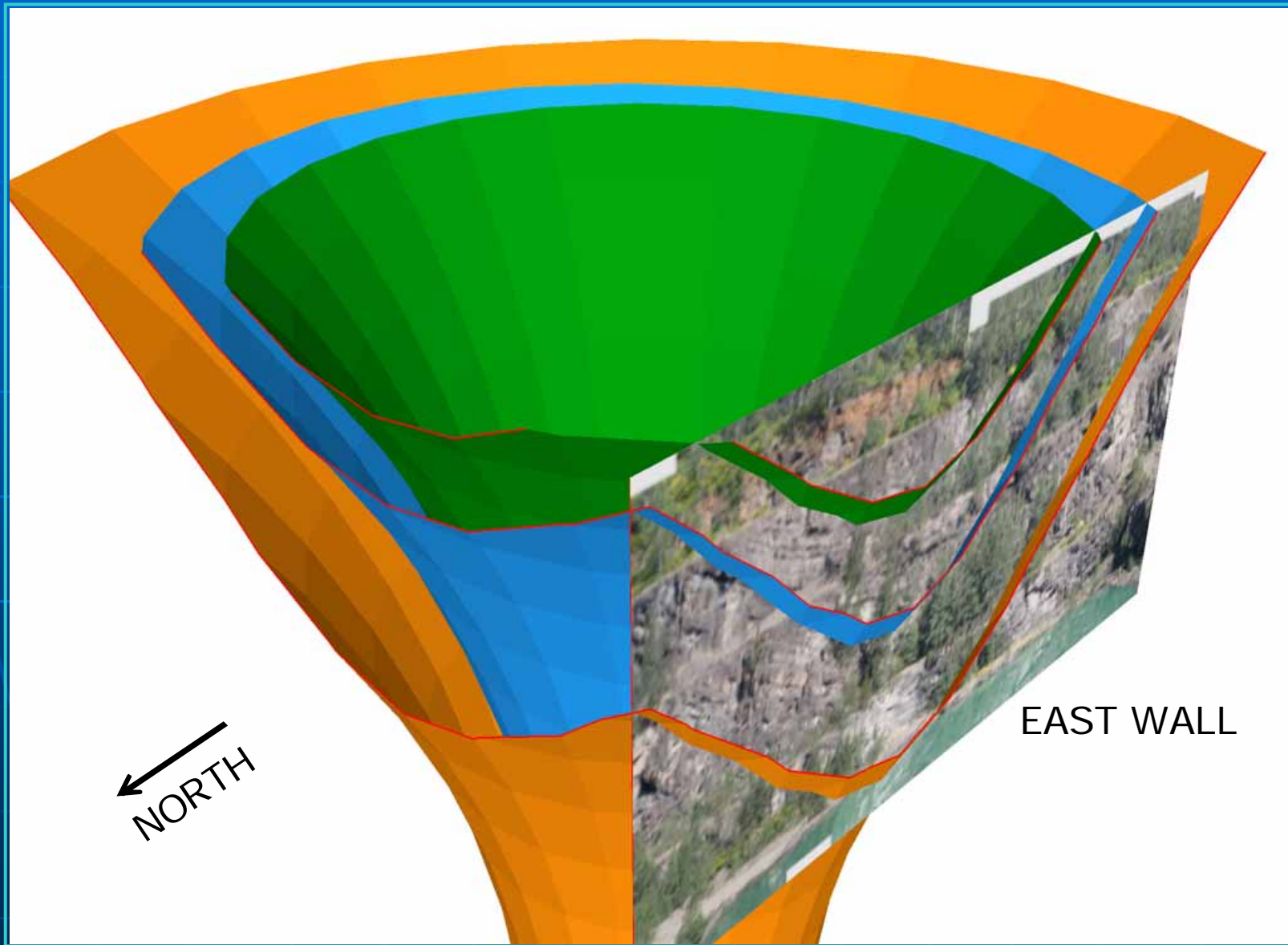
The *NSW Department of Planning* has stated that the annual probability of death in residential areas impacted by industrial facilities shall be less than 1 in 1 million.

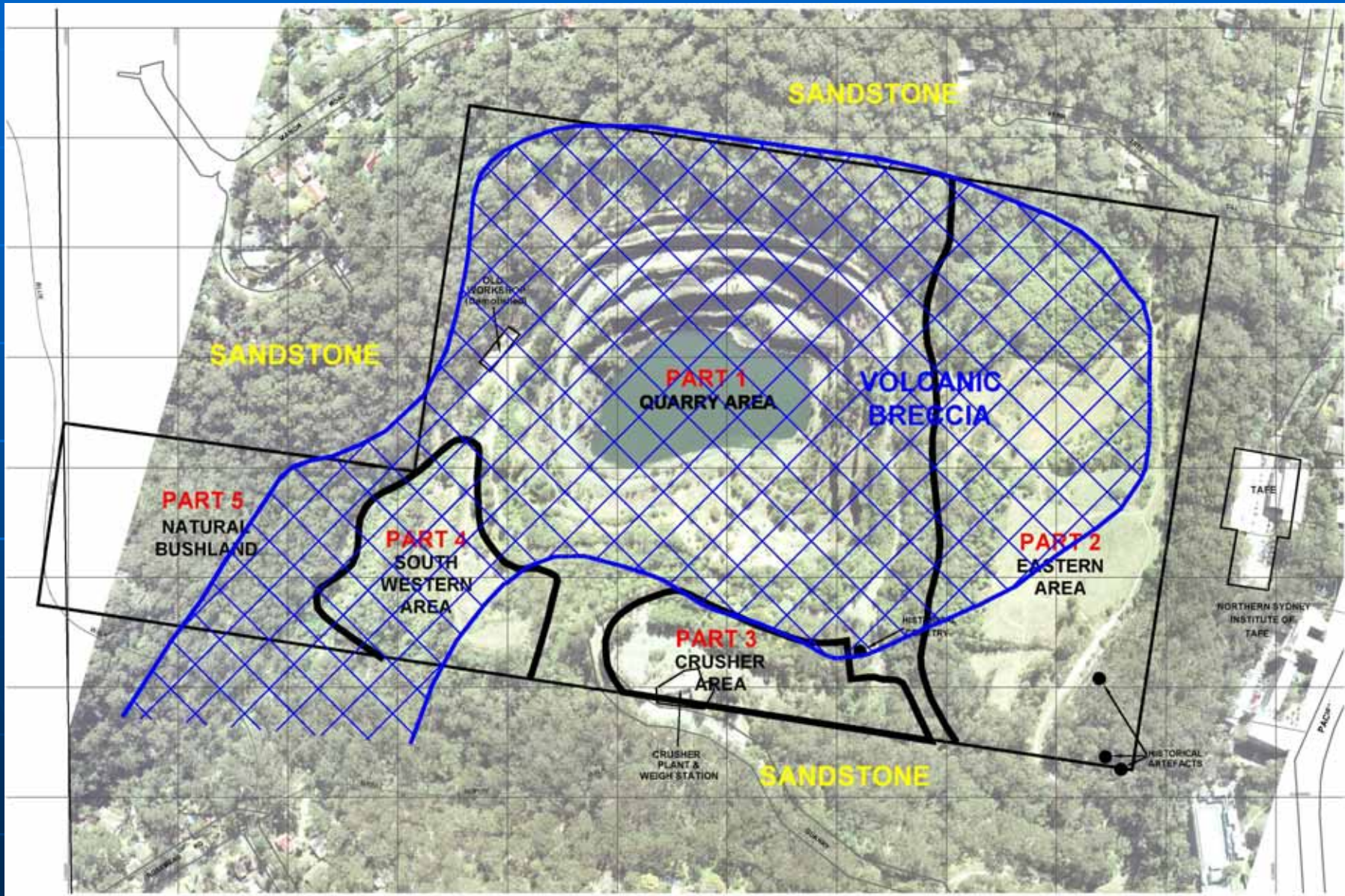
This means there is a 99.999999% chance you will live.

# SITE & GEOLOGY

# HORNSBY DIATREME





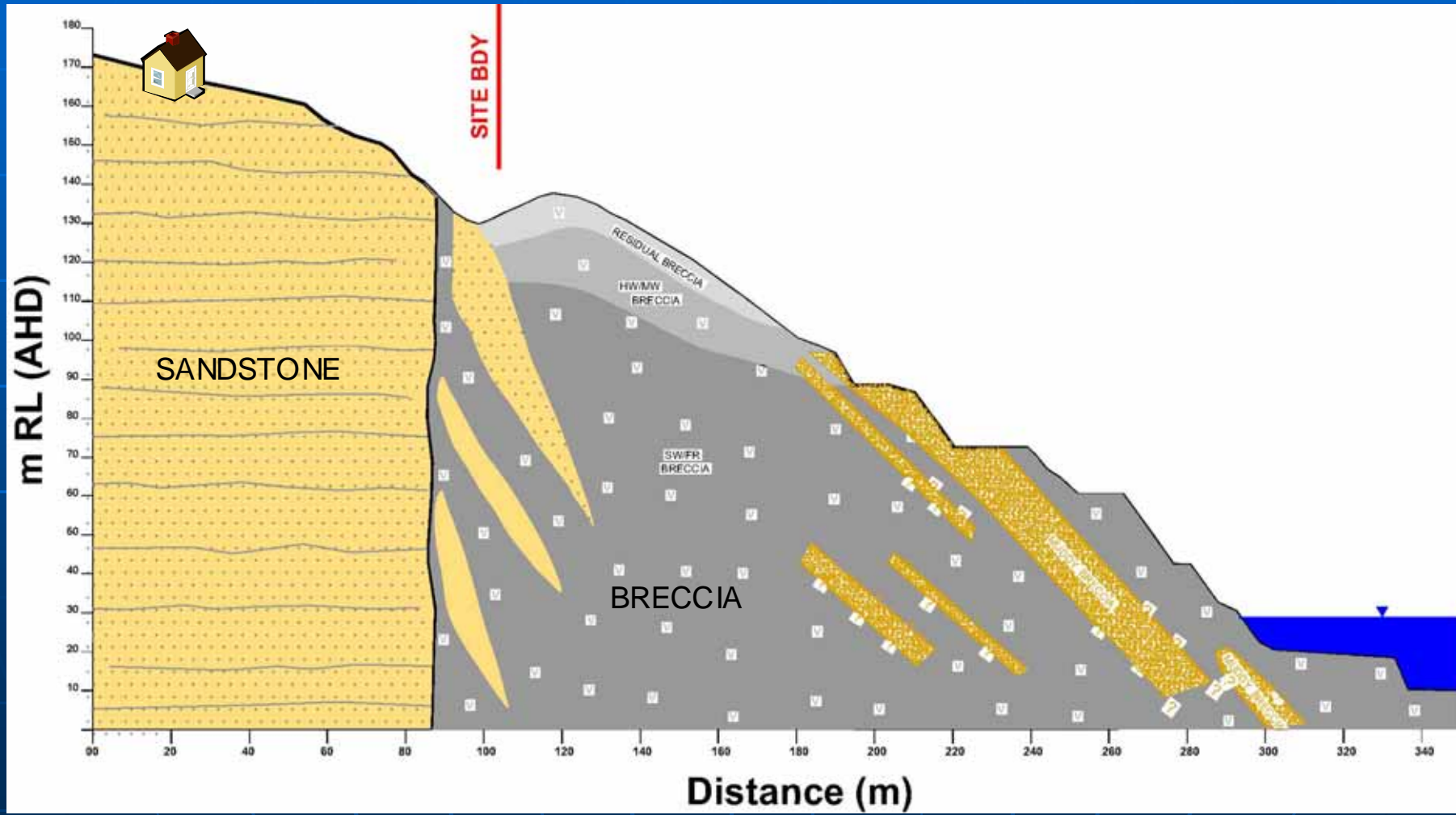


# SANDSTONE STABILITY



# GROUND PROFILE NORTH FACE

# NORTH FACE





# STABILITY & LIKELIHOOD OF FAILURE

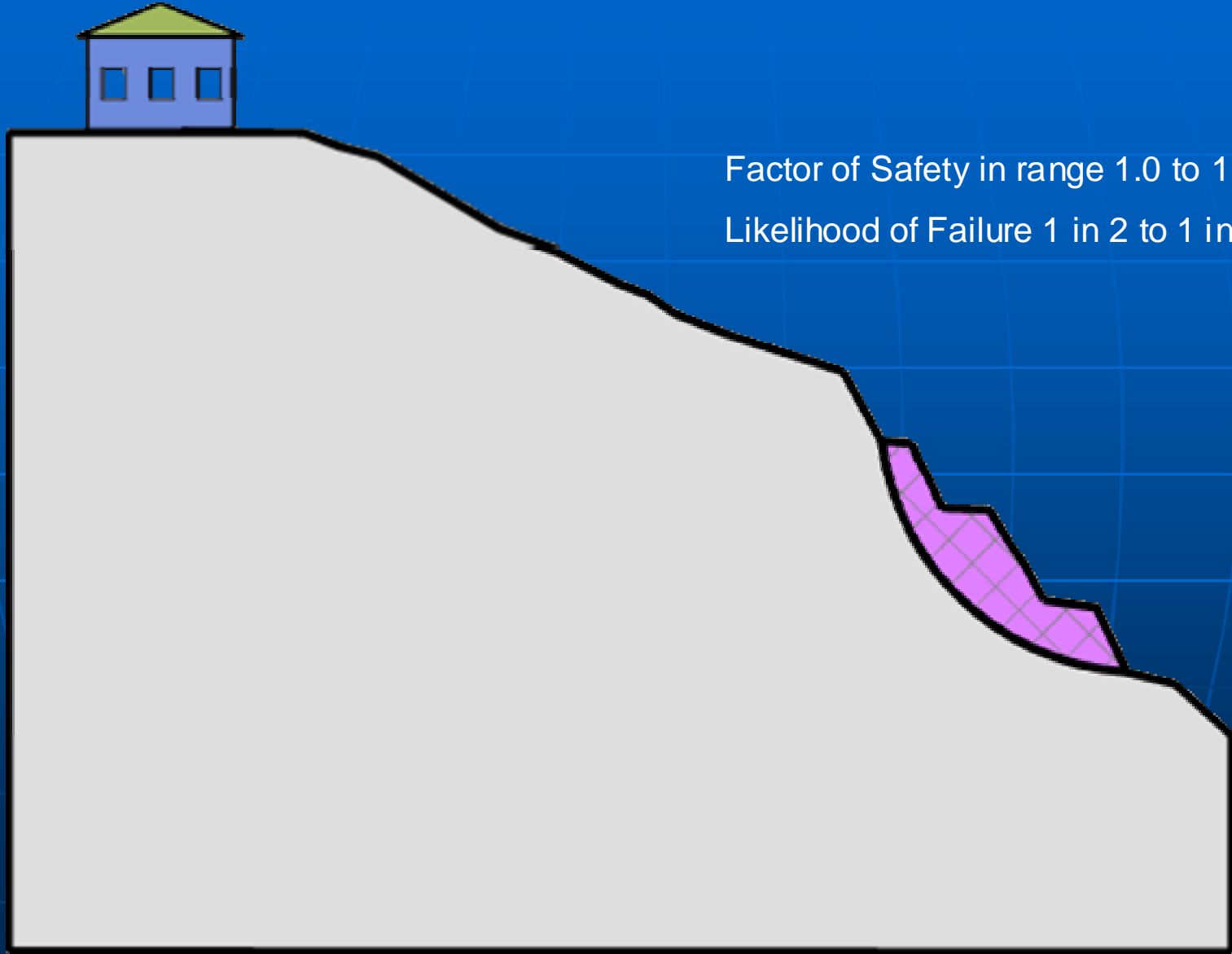
# SMALL TO MEDIUM SCALE

**Small scale**      Single rocks to failures on defects forming small wedges in quarry face – car size, say up to 50 tonnes.

**Medium scale**    Sections of quarry wall failing on defects over 1 or more benches – similar to failure on north wall during mining. Up to 30,000 tonnes.



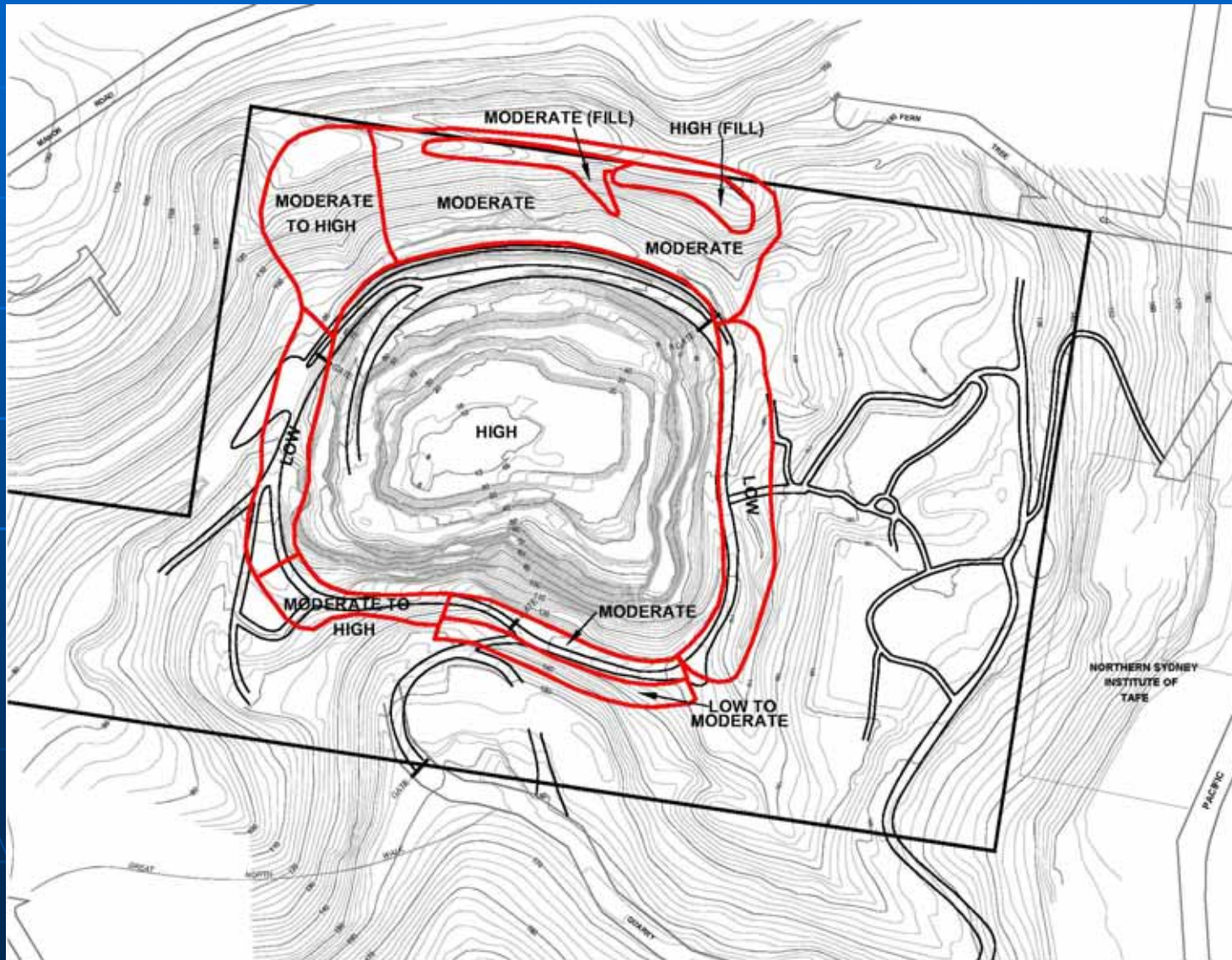
# SMALL TO MEDIUM SCALE



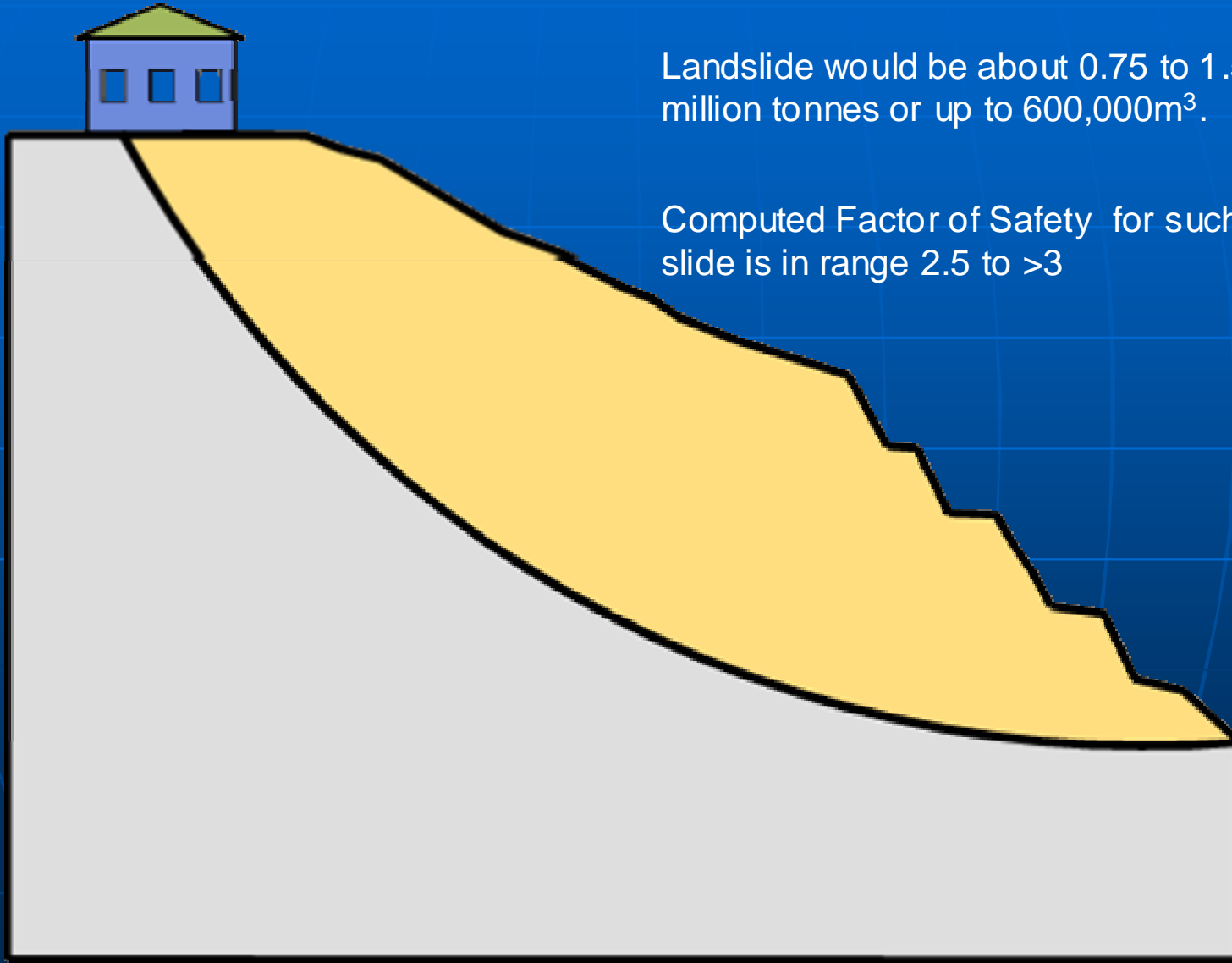
Factor of Safety in range 1.0 to 1.5

Likelihood of Failure 1 in 2 to 1 in 1000

# LIKELIHOOD OF INSTABILITY SMALL TO MEDIUM SCALE



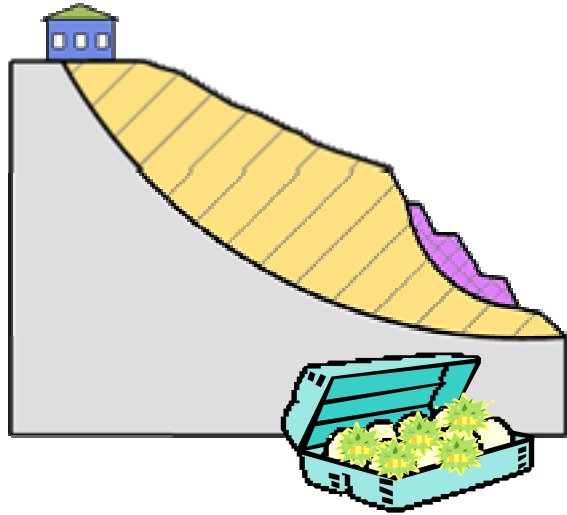
# LARGE SCALE INSTABILITY REACHING HOUSES



Landslide would be about 0.75 to 1.5 million tonnes or up to 600,000m<sup>3</sup>.

Computed Factor of Safety for such a slide is in range 2.5 to >3





Contaminated eggs = landslide big enough to reach houses without warning

0.000,000,003



Grandma in restaurant = chance of being in house at time of landslide

0.9



Probability of death from salmonella = probability of death of grandma from landslide

1.0



What is the chance of death of the most vulnerable resident due to a landslide into the Hornsby Quarry?

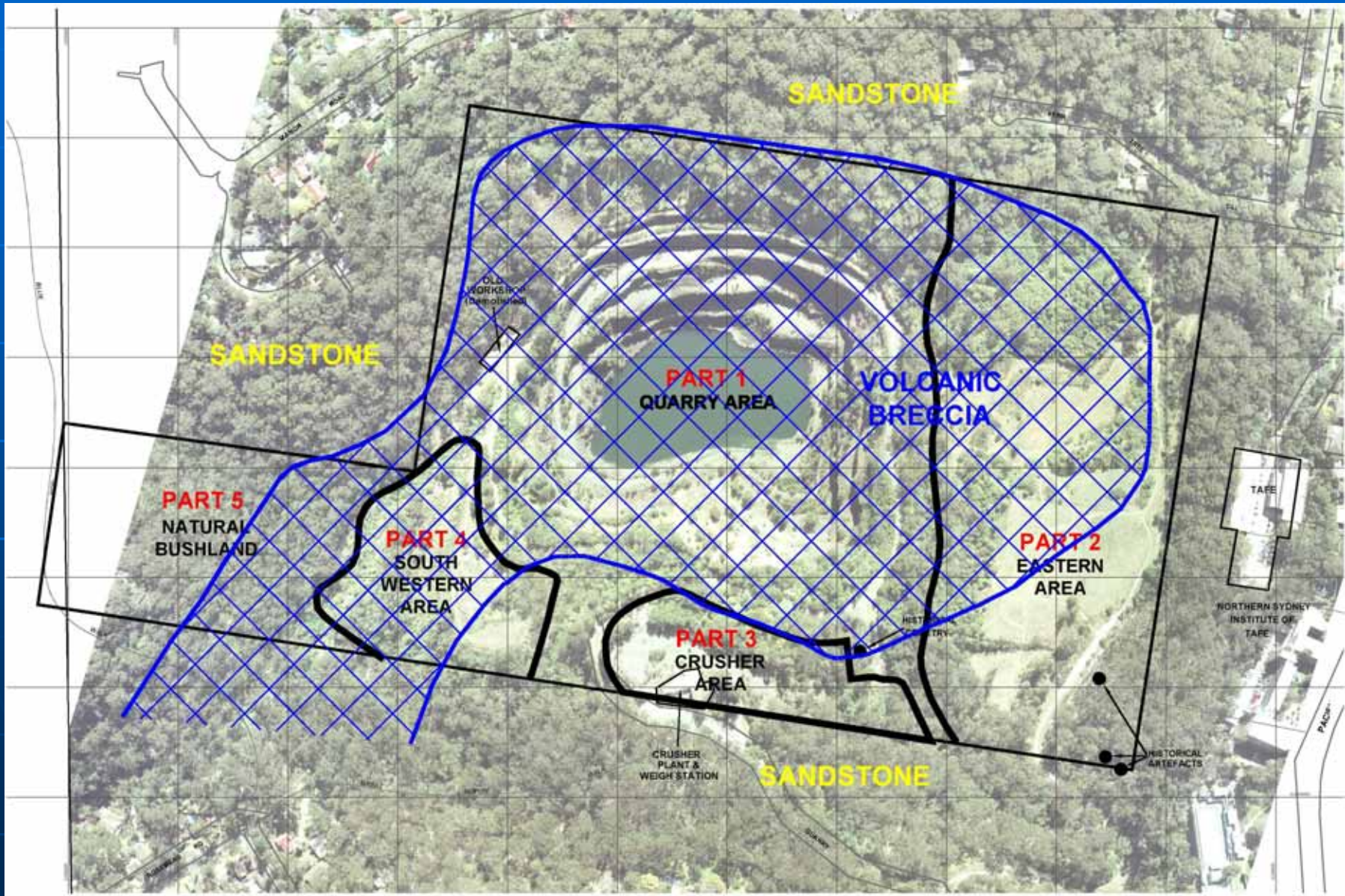


0.000,000,003 x 0.9 x 1.0

**RISK OF DEATH = 0.000,000,003 or 3 in a billion**

# LARGE SCALE INSTABILITY

- **No** meaningful risk of deep seated sliding of the northern face affecting existing buildings and infrastructure to the north.
- **Low** risk of deep seated instability in both the western and eastern faces of the quarry.
- **Moderate** risk of deep seated sliding in the south eastern face - this places a limit on the extent of land use in the crusher area. Without stabilisation works the existing access road at the top of the south face should not become a public roadway.
- **Moderate to High** risk of deep seated sliding in the south western faces of the quarry. This limits the extent of land use in, and access to the south western area.



# SUMMARY

**It is concluded that there is no meaningful risk of failure affecting houses around the quarry.**

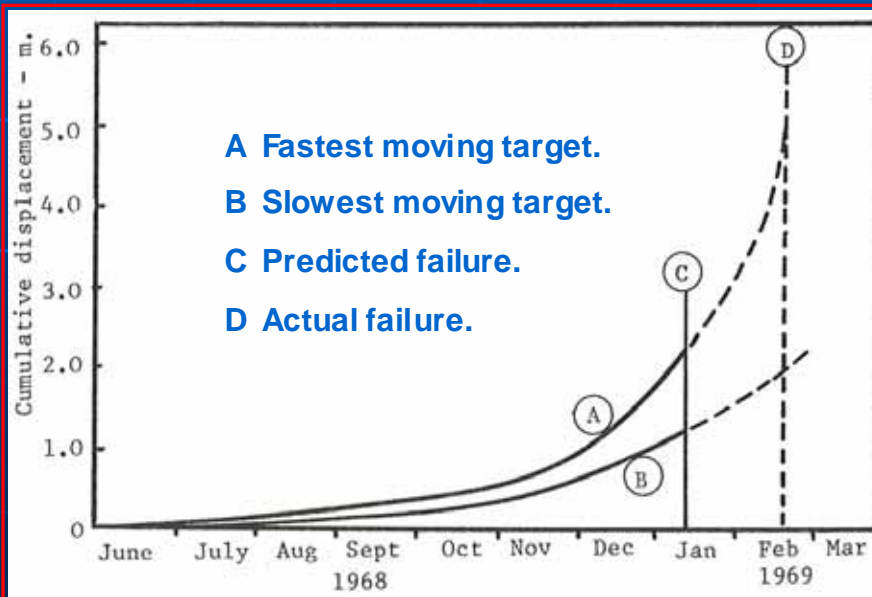
# QUESTIONS

# MONITORING

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Monitoring would enable an appropriate level of safety to be provided for infrequent access such as pump maintenance.

Rock slope failures appear dramatic – but in reality the precursors to failure are evident for long periods leading up to the actual event.



# MONITORING

## INITIAL REGIME

DATA	SUGGESTED FREQUENCY
Survey	Weekly for one month, then monthly. Points around rim of quarry and fill areas above northern slopes.
Rainfall	Automatic Reading – Internet (\$8,000).
Lake Level	Weekly to fortnightly. Council may be able to set up a remote system to limit the number of visits into the pit – such as a painted stake/pole able to be observed from outside the quarry void.
Face Inspections	Quarterly, and following significant rainfall.
Piezometers	Monitor levels quarterly and following major rainfall events.