Comments on Independent Expert Advice: Constructability, Soil and Water ‘Assumptions’ in Banks 2022, Chapman 2023 and Thoms 2023 by PSM Geotechnical Engineering

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Appendix L or M?

PSM summary of DPE review. 3 summary points (repeated by DPE)

1 **Interaction of works with steep terrain.** Extent of area of disturbance for WTG, associated works and constrained road geometry

PSM reponse:

- needs more details.
- Increased confidence: proposed approach will allow site specific control measures within **proposed disturbance boundaries** and final location of works **unlikely** to be larger than the EIS footprint
- Details indicating use of standard engineering practices for controlling soil erosion are proposed, including temporary measures within the construction footprint.

2 Insufficient and incorrect characterization of soil types and land and soil capability

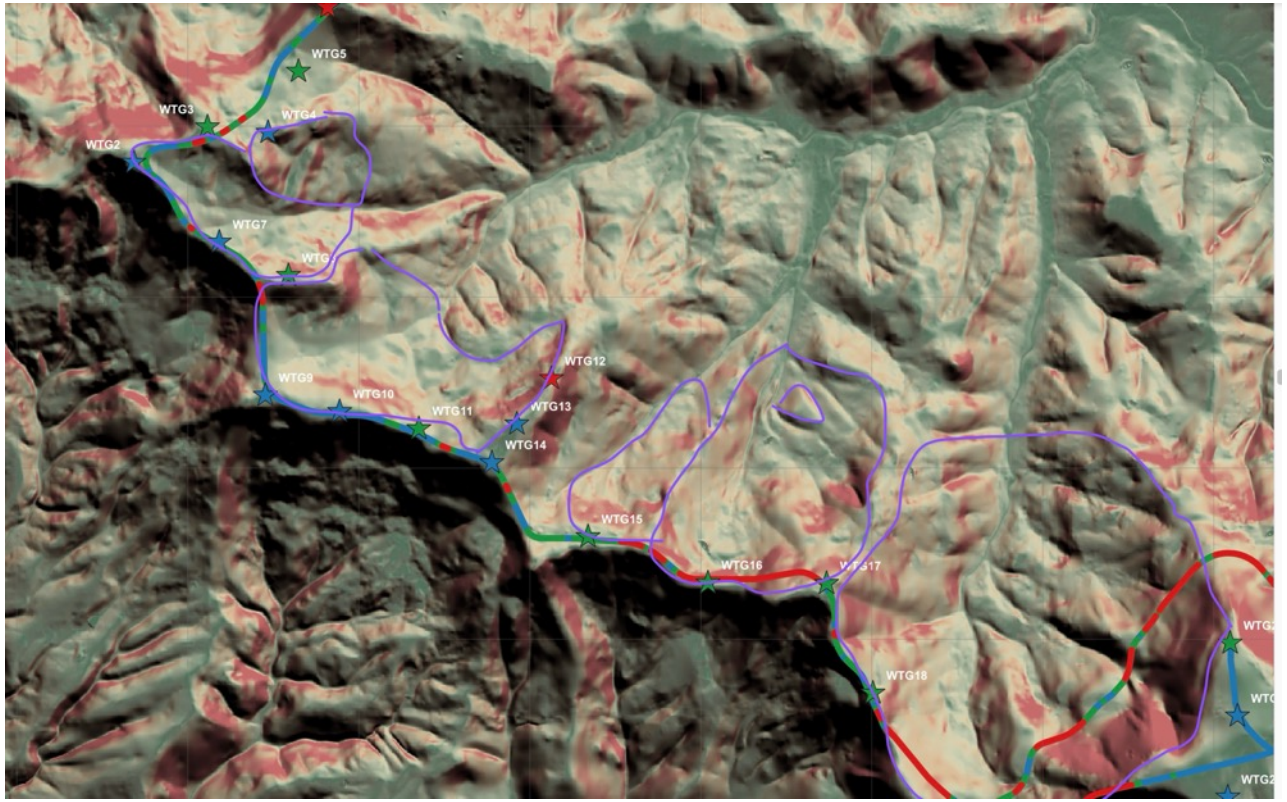
PSM concludes: '*moderate to high erodibility [sic], depending on slope,* ***considered to be inconsequential***'

3 Future effects of decommissioning and climate change

PSM concludes: 'second order and unlikely to result in significant changes to impact assessment'

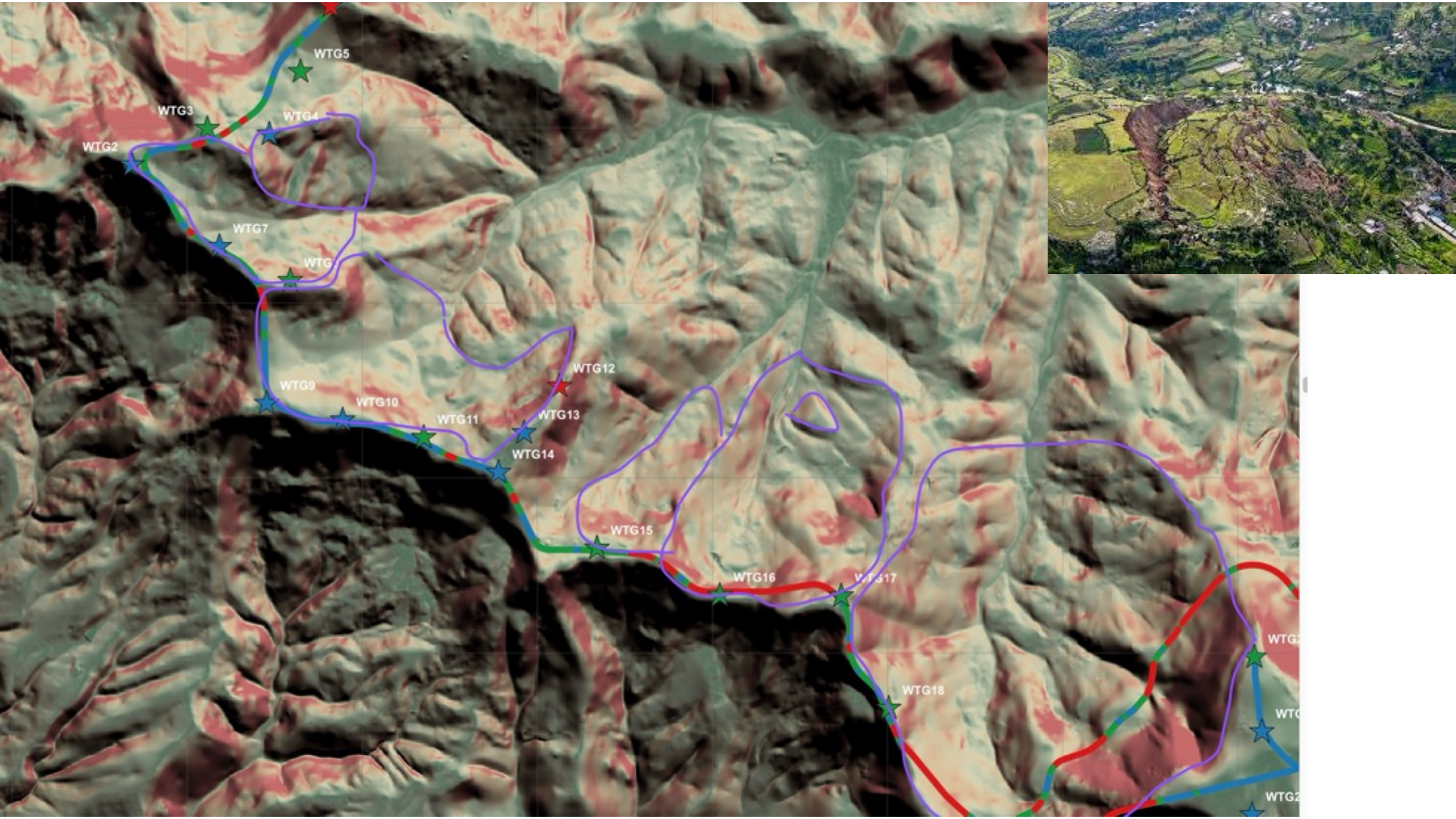
If this proposed was on undulating sandstone derived soils I would be inclined to agree. But it is not.

My response to 1
The footprint remains unknown



Red lines roads with gradients >30%.
Areas enclosed in purple show signs of previous mass movement [Red hillslope mapping tops out at 30% when the slopes are far steeper]. Road gradients in red are steeper than 30%!

- PSM advocates **inappropriate erosion control** measures (Grassed water-ways and level sills). It leaves addressing specialist measures to the construction phase – without examination of difficulty, by then it will be too late.
- Optomistic suggestions of achieving soil stability on very steep batters of self mulching shrink-swell rocky clays for 30 years. **Good luck**
- Ignores mass movement instability – a huge erosion hazard, especially with cut and fill and changes in runoff!
- Does not include impacts of compound and simultaneous impacts of bends, gradients and gradient changes and required road widths on the amount of rock and soil material to be moved.
- Appears to show road gradients >30% when 15% is considered extreme for trucking turbine blades – so will require far more cut and fill.


WTG5
WTG3
WTG4
WTG2
WTG7
WTG12
WTG9
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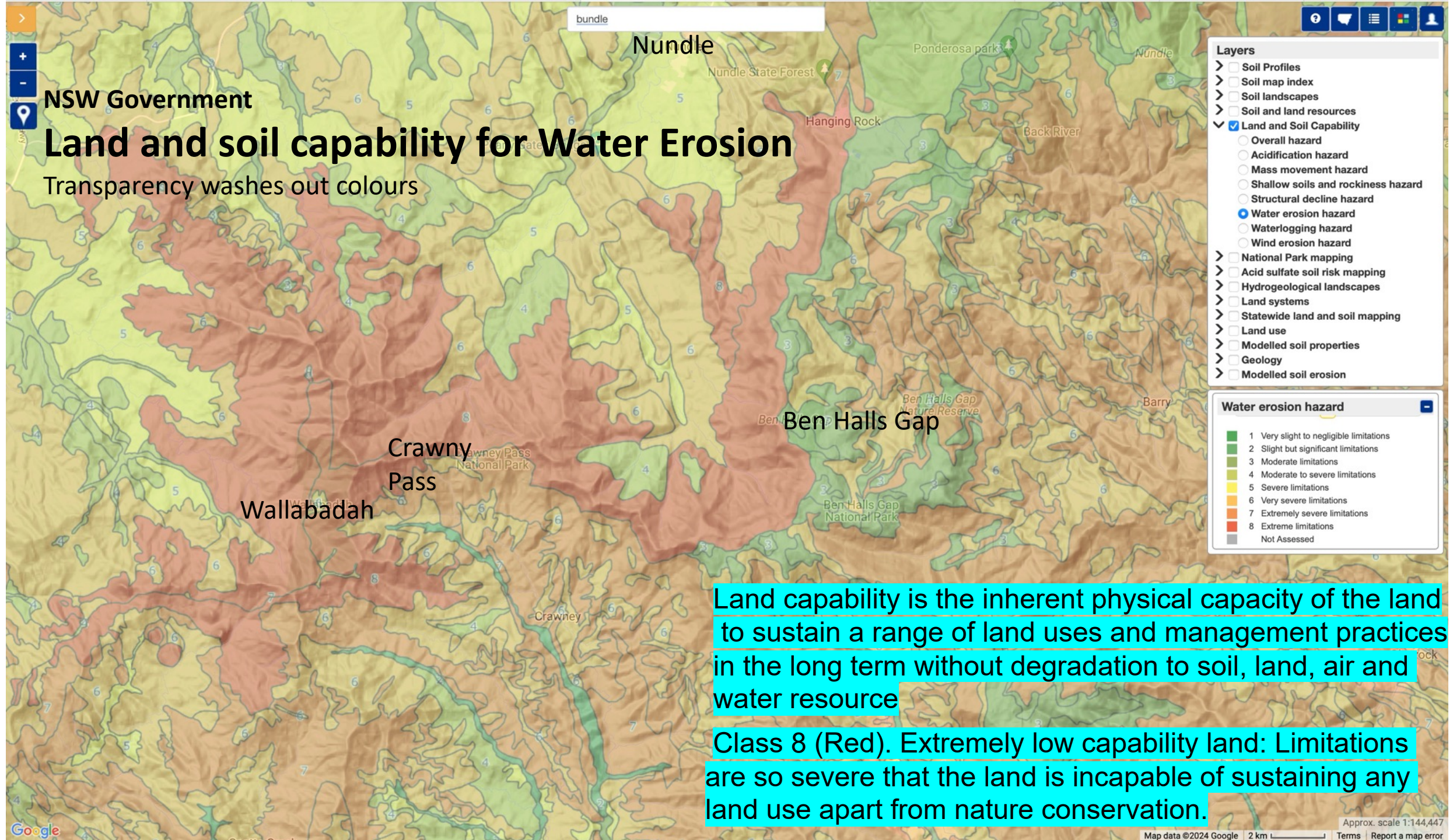
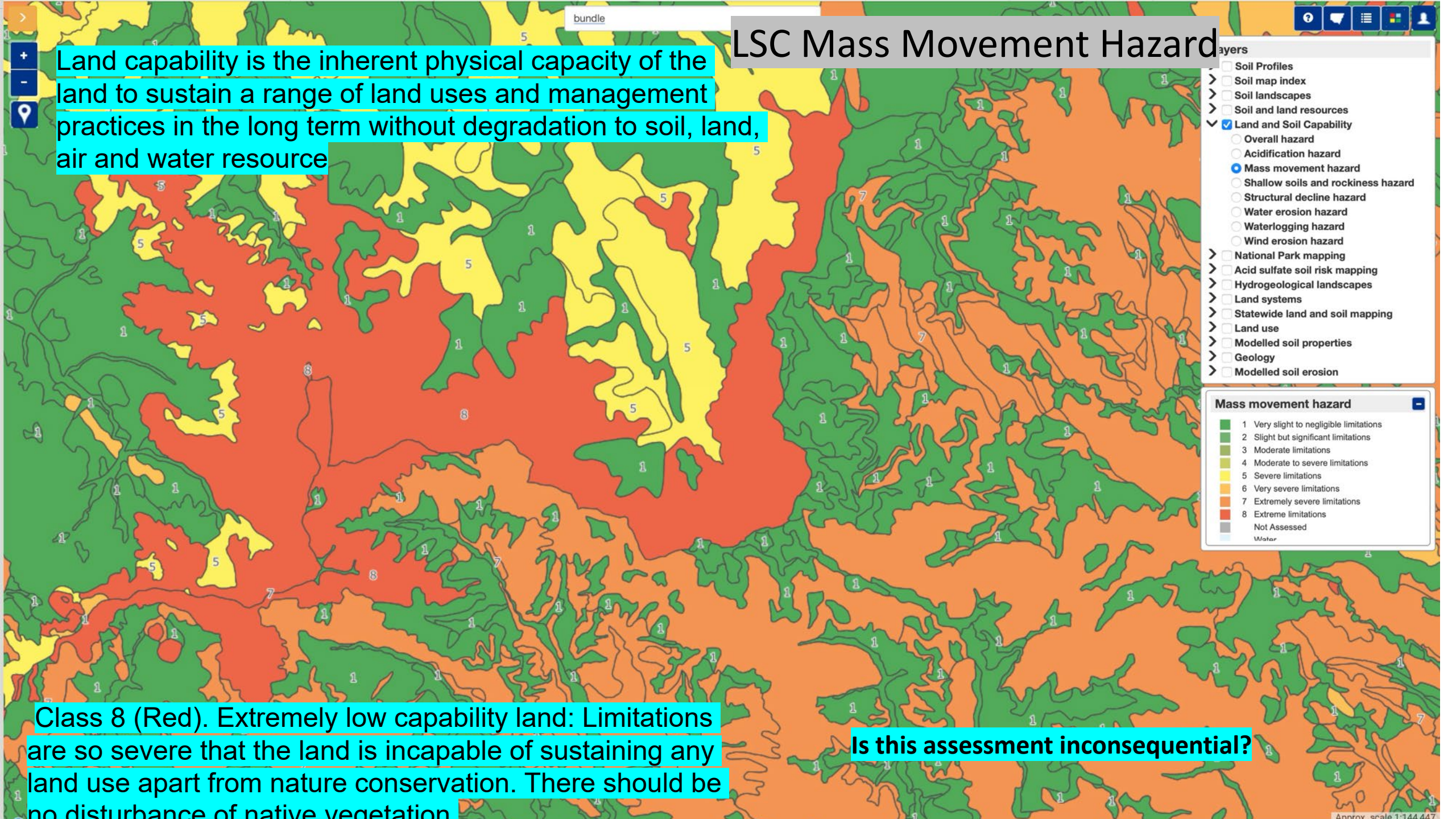
WTG11
WTG13
WTG14
WTG15
WTG16
WTG18

2 “Insufficient and incorrect characterization of soil types and ‘soil capability’ [sic] is considered inconsequential”

Land and Soil Capability includes interaction of land and soil features.

- EIS: Lacks soil info. No holes dug, profiles examined or samples taken – only generalized, unattributed information/assumptions presented.
- No geotechnical data presented, just interpretations. Is it being hidden? Why has PSM **not** considered land instability interactions with erosion?
- But we do have NSW Government information based on fact and science. Why is this information ignored/discounted?


bundle
Nundle
NSW Government
Land and soil capability for Water Erosion
Transparency washes out colours
Crawny
Pass
Wallabadah
Ben Halls Gap
Layers
Soil Profiles
Soil map index
Soil landscapes
Soil and land resources
Land and Soil Capability
Overall hazard
Acidification hazard
Mass movement hazard
Shallow soils and rockiness hazard
Structural decline hazard
Water erosion hazard
Waterlogging hazard
Wind erosion hazard
National Park mapping
Acid sulfate soil risk mapping
Hydrogeological landscapes
Land systems
Statewide land and soil mapping
Land use
Modelled soil properties
Geology
Modelled soil erosion
Water erosion hazard
1 Very slight to negligible limitations
2 Slight but significant limitations
3 Moderate limitations
4 Moderate to severe limitations
5 Severe limitations
6 Very severe limitations
7 Extremely severe limitations
8 Extreme limitations
Not Assessed
Land capability is the inherent physical capacity of the land to sustain a range of land uses and management practices in the long term without degradation to soil, land, air and water resource
Class 8 (Red). Extremely low capability land: Limitations are so severe that the land is incapable of sustaining any land use apart from nature conservation.
Approx. scale 1:144,447
Map data ©2024 Google
2 km
Terms
Report a map error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LSC Mass Movement Hazard
Land capability is the inherent physical capacity of the land to sustain a range of land uses and management practices in the long term without degradation to soil, land, air and water resource
ayers
Soil Profiles
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Not Assessed
Class 8 (Red). Extremely low capability land: Limitations are so severe that the land is incapable of sustaining any land use apart from nature conservation. There should be no disturbance of native vegetation
Is this assessment inconsequential?

Insufficient and incorrect characterization of soil types and 'soil capability' is inconsequential

- Despite diagreements PSM concludes: *'moderate to high erodibility [sic], depending on slope,* ***considered to be inconsequential'***

But Erosion includes:

Rainfall Erosivity, *Soil Erodibility, Slope*, Slope Length, Ground Cover, & Management factors.

- Rainfall erosivity is unknown here but much higher on mountains. Often intense storms – double?
- Disturbed soils are the most erodible – construction and mass movement
- EIS states RUSLE at **471** t/ha/yr !!

> 60 t/ha/yr is considered *extreme* for construction sites. > 2 can impact water quality

- Soil is basaltic: **fine clays** with high levels of iron oxide. Uniquely for Australia has naturally high levels of **phosphorus..** so what..

Basalt derived soils. Known science

- Iron oxides tightly bind P on fine clay particles. P really only moves with erosion.
- Once eroded…very fine clays remain in suspension eg till they reach salty water.
- In low oxygen environments, eg still and hot, such as Chaffey Dam or Darling river drought puddles, the iron chemistry flips and phosphorus is released to the water column.
- Basically P in water is the limiting factor for Blue-Green Algae blooms.
- Other sources include washed fertilizer and existing bank sediments but why add more fuel to the fire?
- Is further decline in water quality in Chaffey Dam/Murray Darling **inconsequential**?

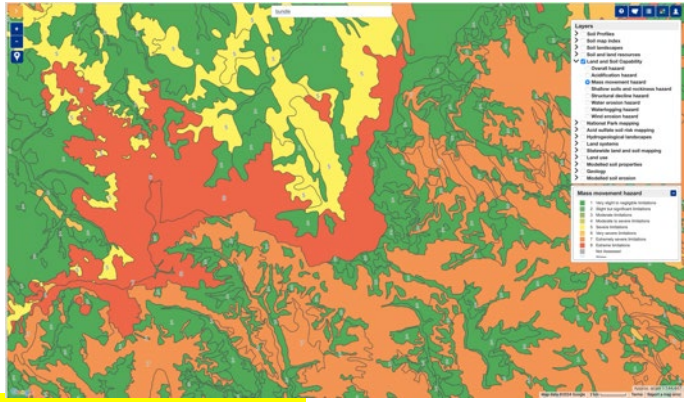
Preventing inconsequential consequences

To prevent water quality impacts erosion control must include sediment control. Sediment control: large stilling basins, often dosed with flocculants. Design consideration 80-90th percentile of fiveday rainfall. Cf comments on mountain climate.

No room for specially designed sediment detention basins. Must sit on flat land. Not slip steps

- Expensive options for piped? delivery of dirty run-off into remote sediment detention basins across unstable land…
- What about mass movement? Where to site runoff and heavy sediment dams?

Land instability consequences



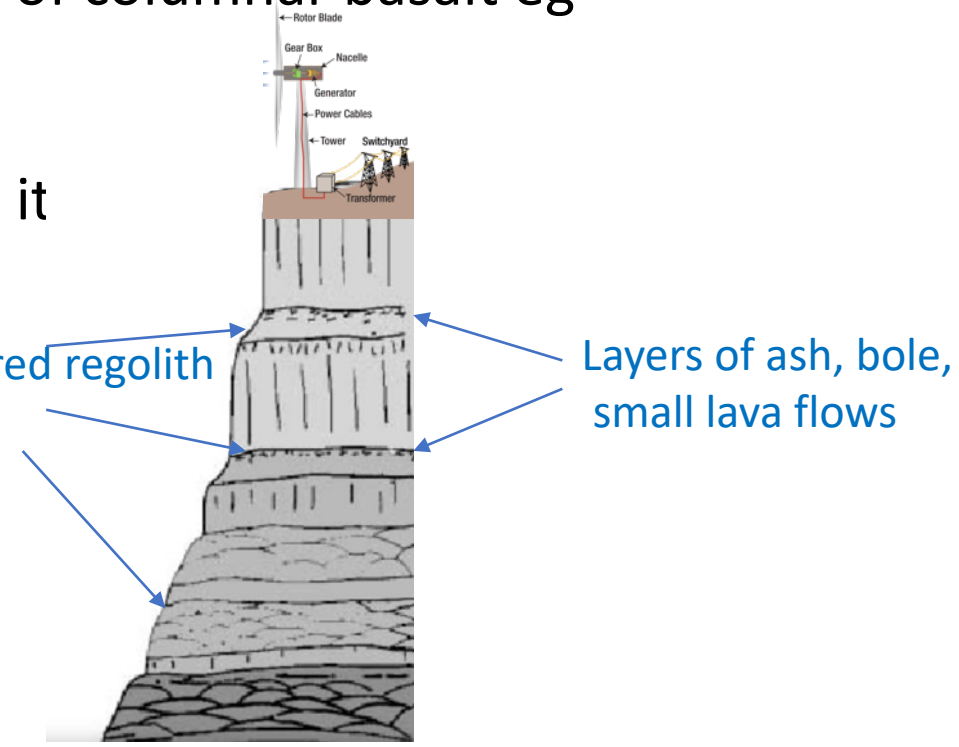
- Does not heed accessible NSW government information. = Unknown but flagged risk. Where is geotech site data?
- Extra loading weights of WTs and foundations, near edges of columnar basalt eg WTG 12
- Earthworks channeling extra water into weak porous soils. As it has for millenia water runs between columns till it this wets weathers and weakens supporting layers.
- Weighted and wettened weathered material loses strength…

Outer columns collapse taking infrastructure over the edge.

Any actual onsite assessments?

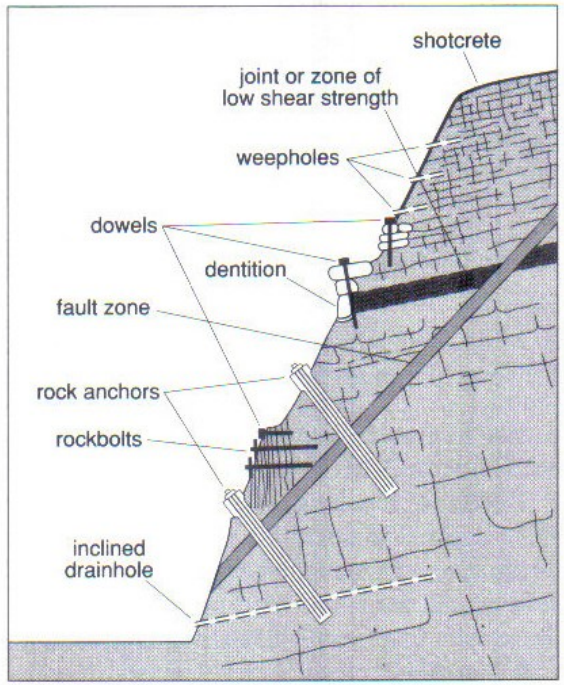
Just opinions & assumptions.

Who carries cost of failure? Company or community?

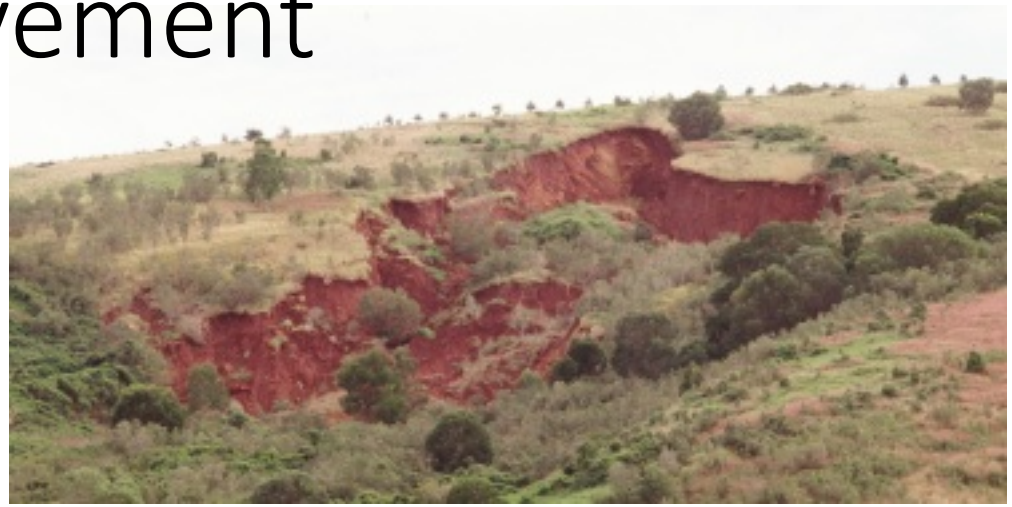


Landslip and disturbance

- Not just steep slopes on columnar basalt. The soils are plastic cracking clays – they swell absorb lots of water, get heavy, loose strength/deform/collapse.
- Cut –basal sapping. Fill extra weight –esp if wet.
- Keep dry! Eg impact of a small amount of extra run-on
- Stabilisation very expensive! but not addressed till construction phase. Significant economic risk. Who pays?



Consequences of mass movement



- Massive soil disturbance and erosion
- BGA blooms
- Smothered aquatic habitats
- Very Expensive to repair eg Willow tree road ~1km collapse ~ $38m, New England Highway at Murrurundi gap
- Roading disturbance on slopes >30% for 5km for 30 years. Likelihood?
- Who will foot the bill if/when damages exceed financial viability?

Coarser sediment impacts

- Mass movements choke pools in streams – destroying aquatic habitat for long distances

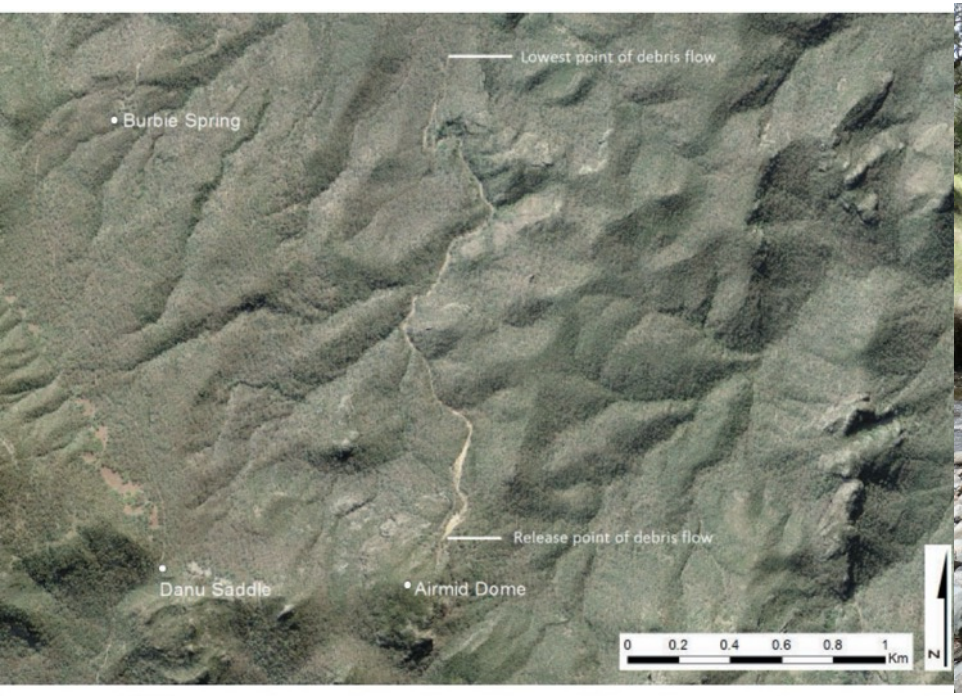


Figure 6. Airmid Dome debris flow.

3 Decommissioning according to PSM is a ‘second order effect’!! But still an environmental impact over the life of the development

Infrastructure life of 30 years. Logically this includes roads.

Rebuild after extra effort?

No landslip or erosion for 30 years!! Works must be able to withstand mountain storms, flooding, snow events [with blocked drains and culverts]. Is there a guaranteed maintenance/repair budget if the development is unfinancial?

If decommissioning involves a similar amount of work as commissioning then the disturbance pattern is actually a repeated first order effect.

Conclusions

- Extent of disturbance is unknown but likely far bigger than the EIS. And still not properly mapped, assessed or designed against challenging terrain
- Cut and fill, changes to water flows and construction disturbances invite mass movement in an already hazardous situation
- Erosion and sediment control is definitely of consequence, very difficult and very expensive to be effective.
- Repairing landslips that take out infrastructure is **problematically expensive and may end up being a societal cost.**
- True economic and environmental **risks** and **costs** have not been calculated into the financial or environmental viability of the development

This is obviously a risky and difficult location.

Instead invest in an alternative, safer and more suitable location. There are plenty to choose from.

Finally, this situation should never have got to this point. Appropriate soil and land EIS standards are needed for environmental impacts to be properly considered