

Q&A's from Online residents' meeting - 1.11.21

1. If there is a danger to the school, surely there is a danger to other properties? [SH]

Refer to report: [26th February 2020 - Godre'r Graiq Village Preliminary Hazard and Risk Assessment – 7372e.3337.](#)

Based on *conditions at the time of the assessment*, the consequences to the school of a landslide are significantly different than for residential houses. Based on observations there is likely to be a lower volume of material on the flanks of the quarry spoil tip and the direction of travel of a landslide from the quarry spoil tip would likely be perpendicular to the slope contours, i.e., towards the school – please refer to figures 12-14.

There is insufficient data to undertake a quantified risk assessment for the wider village area (all areas excluding the school). Consequently, a qualitative assessment based on AGS (2007) was undertaken based on a degree of belief approach.

Probabilities of detachment and runout considered suggest a likelihood of impact on residential properties of:

- $>10^{-4}$ e. “unlikely” for slopes of 27° or more,
- $>10^{-5}$ e. “rare” for slopes of 27° - 23°
- $>10^{-6}$ e. “barely credible” for slopes of $<23^\circ$

The consequences of impact were considered to be moderate damage to some of the structure i.e., medium consequence. This suggests a “low” to “very low” risk to property from this hazard, depending on the slope angle. This is “usually acceptable to regulators” (AGS, 2007).

It is likely that current landowners will be responsible for ongoing maintenance and stability matters, including risks presented to downslope people, property, and infrastructure.

2. Will water trigger a landslide? Are mitigation works planned? [SH]

[Refer to report: 25th February 2020 – Godre'r Graig Primary School – Preliminary Investigation and Additional Assessment 7234e.02.3302](#)

The slope stability and preliminary sensitivity analysis showed that the Quarry Spoil Tip is likely to be marginally stable, but likely to be unstable as a result of a significant weather event increasing porewater pressures in the tip (or increasing the groundwater table). If the Quarry Spoil Tip were to be scrutinised to modern safety criteria, it would need significant alteration or betterment to increase its stability or remedial options would be needed to reduce the risk it poses to elements at risk to low.

An option from our previous assessment (ESP.7234e.02.3302 Rev 2 (February 2020)) was a combined approach of incorporating drainage to create betterment, installing monitoring points and producing a warning system. NPTCBC discounted due to:

- Uncertainties at this stage in achieving a 'stable' condition that meets modern design standards.
- Confidence in the efficacy of a warning system, and safeguarding of school users, without significant investment in supplementary investigation, long-term ground monitoring and assessment. It is likely the school would remain displaced until defined.
- The unknown scale of remedial work following any future ground movement with a remaining risk of future displacement of the school.

It is likely that current landowners will be responsible for ongoing maintenance and stability matters, including risks presented to downslope people, property, and infrastructure.

3. Query on reliability of volume estimates (If you got your calculations out by 1%, we're talking by your analogy 2000 metric tons of additional material). [SH]

Refer to reports: [25th February 2020 – Godre'r Graig Primary School – Preliminary Investigation and Additional Assessment 7234e.02.3302](#) & [22nd September 2021 – Godre'r Graig Tip Remediation Options Report – 7234e.04.3564](#)

Volume estimates were based on SI, geophysics and LiDAR.

4. Reports say there's very little movement that's being found in the tip? The danger has changed to the whole of the school? [G/LW]

Refer to report: [22nd September 2021 – Godre'r Graig Tip Remediation Options Report – 7234e.04.3564](#)

Monitoring shows downward movement of the Quarry Spoil Tip (towards the school). Our previous assessment suggested that the Quarry Spoil Tip was *Marginally Stable*, i.e., that it was likely to fail at some time in response to destabilising forces reaching a certain level of activity. The information from the inclinometers suggest that the Quarry Spoil Tip is moving and is *Actively Unstable*, i.e., destabilising forces are producing continuous or intermittent movements.

Refer to report: *26th February 2020 - Godre'r Graig Village Preliminary Hazard and Risk Assessment – 7372e.3337.*

Based on *conditions at the time of the assessment*, the consequences to the school of a landslide were significantly different than for residential houses. The direction of travel of a landslide from the quarry spoil tip would likely be perpendicular to the slope contours, i.e., towards the school – please refer to figures 12-14.

5. What would be the extent of a barrier? [G/LW]

Refer to report: [22nd September 2021 – Godre'r Graig Tip Remediation Options Report – 7234e.04.3564](#)

The barrier and/or bund is likely to be 100 – 150m long (assumed bund 2-3m high), perpendicular to the slope contours.

We do not consider a wall/barrier a technically feasible option at present.

It is unlikely to be suitable to construct a soil/earth bund feature on the slope above the school for long term protection due to stability issues.

A bund would need to be designed and include adequate drainage for long term stability. If an engineered bund were to be created on the school site and be situated between the Quarry Spoil Tip and the 12 residential houses, the anticipated damage to residential houses would be lowered, and we would assume that little damage would occur.

Detailed design and planning require detailed input and consultation and will need to incorporate some risk mitigation measures for properties downslope of the school.

6. The best option is to remove the tip and then there is no problem at all. [G/LW]

Refer to report: [25th February 2020 – Godre’r Graig Primary School – Preliminary Investigation and Additional Assessment 7234e.02.3302](#)

This was discussed as an option. Possible economic and social impacts were highlighted in our notes and comparison of remedial options (Table 12).

Refer to report: [22nd September 2021 – Godre’r Graig Tip Remediation Options Report – 7234e.04.3564](#)

Removal of the quarry spoil tip presents land ownership/responsibility problems.

In addition, the cost of this method is likely to be >£6million.

7. Access possible for walks so why is investigation limited? Is a landslide only going to affect the school? [RW]

Refer to report: [25th February 2020 – Godre’r Graig Primary School – Preliminary Investigation and Additional Assessment 7234e.02.3302](#)

Given the nature of the site, several limitations were imposed on the investigation. Limited access to the site was primarily due to constraints posed by dense vegetation and steeply sloping ground. Works were only carried out where safe access and working areas could be achieved. Vegetation clearance was undertaken to gain access to previously inaccessible areas however, a large proportion of the study area remains covered with vegetation and limited, to no investigation was undertaken in these areas.

Given the difficult nature of the site, several investigation options were reviewed taking into consideration many factors including but not limited to, Health and Safety, the effectiveness of the method and costs.

Intrusive investigation could only be undertaken in areas of cleared vegetation and where it was safe to do so. Geophysical survey was implemented to supplement the Ground Model.

Assessments have been undertaken on the available information considering the site constraints. Modelling has been careful to acknowledge uncertainties linked to the constraints.

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8. Given the volume of material that might come down that mountain if the school gets pushed over, does that add to the potential impact? [CG]

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Any bund would need to be designed and include adequate drainage for long term stability.

If an engineered bund were to be created on the school site and be situated between the Quarry Spoil Tip and the 12 residential houses, the anticipated damage to residential houses would be lowered, and we would assume that little damage would occur.

Design and planning permission will require detailed input, consultation and will need to incorporate some risk mitigation measures for properties downslope of the school.

9. Are the assessments independent? Have any Category 3 checks been done? [LV-P]

ESP are an independent private practice who work for a range of public and private sector clients.

The Coal Authority (CA) were consulted by NPTCBC in July 2019. Refer to: [Coal Authority Tip Inspection Report, July 2019:](#)

CA Consequences, 2019:

- *A major failure of the quarry spoil could potentially reach Godre'r Graig School. Although unlikely, a slope stability analysis based on available information supported by ground investigation data would be beneficial to assess the extent and likelihood of such a failure.*
- *Blockages of the drainage infrastructure to the rear of Godre'r Graig Primary School would result in flooding and potential slope instability."*

CA Recommendations, 2019:

In order to ensure the risk of instability and public safety remains low...

- *Consider clearing vegetation to allow inspection of drainage routes at Site 2.*
- *Ensure drainage infrastructure to the rear of Godre'r Graig Primary School is regularly inspected and maintained.*
- *Consider undertaking a slope stability analysis for Site 2 based on available information supplemented by ground investigation.*

Category 3 checks are only for highway structures and buildings as part of the design process.

10. Why is the leap of faith gone from second limit equilibrium model to closure? [LV-P]

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Given the nature of the site, several limitations were imposed on the investigation. Limited access to the site was primarily due to constraints posed by dense vegetation and steeply sloping ground. Works were only carried out where safe access and working areas could be achieved. Vegetation clearance was undertaken to gain access to previously inaccessible areas however, a large proportion of the study area remains covered with vegetation and limited, to no investigation was undertaken in these areas.

Several investigation options were reviewed taking into consideration many factors including but not limited to, Health and Safety, the effectiveness of the method and cost. Intrusive investigation could only be undertaken in areas of cleared vegetation and where it was safe to do so. Geophysical survey was implemented to supplement the Ground Model.

Assessments have been undertaken on the available information considering the site constraints. Modelling has been careful to acknowledge uncertainties linked to the constraints.

The Ground Model, material parameters and groundwater conditions have primarily been determined from the investigation and geophysical findings, along with established correlations. These and other assumptions for the stability models are listed.

Considering the reduced availability of information on ground parameters, the values used in the model were adopted from a combination of in-situ testing and laboratory testing or established correlations from other soil characteristics and information to specific materials is discussed. We considered that this approach provided a realistic indication of the soil and water conditions at the site; a requirement for further evidence was identified.

11. Is there three dimensional limit equilibrium modelling? [LV-P]

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Based on conditions at the time of the assessment, intrusive investigation could only be undertaken in areas of cleared vegetation and where it was safe to do so. Geophysical survey was implemented to supplement the Ground Model.

2D limit equilibrium slope stability modelling was undertaken utilising GeoStudio SlopeW to assess the Adequacy Factor (AF)/Factor of Safety (FoS) within the slope. The FoS approach was adopted as it considers the ratio of disturbing forces against restoring forces and gives a simple indication to stability, i.e., stable, or marginally stable.

The slope profile adopted was that of the tip above the school; the modelled section has been drawn perpendicular to contours where nearby borehole information has been obtained, supplemented by the geophysical data. The slope profile has been surveyed and visual observations and slope measurements made during the geomorphological mapping were checked against what was considered the steepest section.

In order to understand the tip stability in modern day design situations/sensitivity, the model was run adopting partial factors for Design Approach (DA) 1, Combination 1 (C1) and Combination 2 (C2); this suggested inadequate FoS.

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12. There is not one jot of evidence in the reports I have read which says the land will move – plenty which says the tiling’s / quarry waste MIGHT in the event of an extreme weather event. [by email]

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13. Why are NPTC so keen NOT to demand that the polluter cleans up their mess? [by email]

It is likely that current landowners will be responsible for ongoing maintenance and stability matters, including risks presented to downslope people, property, and infrastructure.

14. It is the tilings [sic] and quarry waste which could move. So why not remove those or compel the industry that made the mess to clear it up and keep the school open? [by email]

It is likely that current landowners will be responsible for ongoing maintenance and stability matters, including risks presented to downslope people, property, and infrastructure.