Q&A's submitted in writing following Public Meeting – 08.11.22

1) Why have two different risk assessment methodology been used for
A: The School Building
B: The Houses either side. ?

The houses and the school both have the same number of occupants,(like ESP, I have chosen to use cumulative data for household occupancy), and the houses are occupied for a much larger proportion of the day, The risk is of debris entering the yard is that of debris entering the gardens of the houses.

The quarry spoil tip is a discreet, man-made, non-engineered feature and is ***generally confined to a narrow zone above the school***. ESP were asked to provide an assessment of the terrain above Godre'r Graig school to assess land stability hazards and outline risks for consideration.

In the ESP February 2020 Preliminary Investigation and Assessment report, several advantages and disadvantages for a range of possible remedial approaches were discussed. To allow a simple comparison between options, a semi-quantitative scoring system was used to summarise their relative overall benefit (most to least favourable):

1. Drainage Betterment and Warning System – Install drainage to create betterment only, install monitoring points and produce warning system of type/method/detail to be agreed (2 points). ***Most favourable***.
2. Close the school (1 point).
3. Avoid the Risk – Remove the Tip (minus 1 point).
4. Reduce Frequency/Improve Stability – Incorporate drainage to agreed design objectives (minus 2 points).
5. Reduce Consequence – Retaining Wall, Barrier, netting (minus 4 points). ***Least Favourable.***

We recommended NPTCBC review and agree, or adjust, the suggested scores as necessary given their knowledge about the possible costs, social impacts and practical implications of the remedial options outlined. Consideration of the remaining design life of the school may impact scores chosen for each option. The most favourable option was ruled out, as the authority are not prepared to take any risk in terms of pupils or teachers re occupying the school. Further, it is noted that there is no tried and tested warning system for the monitoring of tips

and any monitoring would be experimental, which was also deemed as an unacceptable risk to the authority.

Subsequently ESP were asked by NPTCBC to consider, and provide budget estimates for, works associated with the tip on the following three options only:

1. The development of a design and production of a budget estimate for the removal of the spoil materials associated with Cilmaengwyn tip (Godre'r Graig Tip). ***Option 3 above***.
2. The development of a design and production of a budget estimate for a hard engineering solution in the form of bunds, catch walls etc., to protect Godre'r Graig Primary School from the slip of any spoil material associated with Cilmaengwyn Tip (Godre'r Graig Tip). ***Option 5 above***.
3. The development of a design and production of a budget estimate for demolition of Godre'r Graig Primary School building and reusing the site with a community benefit. This option will have to take into account the effect on properties downhill of the school from the slip of any spoil material associated with Cilmaengwyn Tip (Godre'r Graig Tip).

The outcome was a summary of the main costs for each of the three options and provided high level comments on unknowns, assumptions, and other areas for potential costs.

Note: the February 2020 report was based on a condition of 'marginal stability' which may not be the case based on subsequent ground movement monitoring data. 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 forced reaching a certain level of activity. The information from the inclinometers suggest that the Quarry Spoil Tip is moving and may be considered Actively Unstable, i.e., destabilising forces are producing continuous or intermittent movements.

2) Why was this methodology chosen and what was the criteria used? Who decided on this methodology? Why differentiate?

Based on conditions at the time of the assessment, the consequences to the school of a landslide were 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 and not the residential properties in the wider village area.***

For the wider village area, a qualitative assessment based on AGS (2007) was undertaken based on a degree of belief approach. The consequences of impact were considered to be moderate damage to some of the structures, i.e., medium consequence. This suggests a "low" to "very low" risk to residential property from this hazard, depending on the slope angle. This "low to very low" risk is "usually acceptable to regulators" (AGS, 2007).

3) If the risk assessment methods were the same for both, what would the outcome be?

Unknown. The approaches have been tailored based on the available information, ground model, site settings, and risk profiles. See also the response to Question 2 above.

4) Cumulative data for movement. Please explain this method and what it means.
A: What are the tolerances of measurement with the machinery used?
B: how much allowance has been discounted for settlement as the machines were installed by excavation and reinstatement. Eye witnesses report that they were back filled without "tamping" Can all movement recorded be attributed to this?
C: Has all data below tolerance levels been discounted to zero within the cumulative analysis?

Inclinometer system accuracy is typically +/-2mm over a 30m length (vertical in borehole); recorded movement exceeds the potential margins of error. Trends and relative changes in the data are more important than spot readings; this information is then considered in relation to the Ground Model and uncertainties.

Monitoring of inclinometers records biaxial incremental lateral ground movement from an initial and previous data point, i.e., cumulative movement over the duration of seasonal/annual monitoring which is represented in visit-to-visit and cumulative (total) movement on graphs.

Inclinometers are installed in boreholes at depth, not trial pits. No excavation/reinstatement via tamping is linked to the inclinometers, so it is unclear what was eye-witnessed.

5) What date were The Council Executives informed that an investigation into the area was needed?

NPTCBC requested an initial opinion on general stability in the area in Spring 2017. This was linked to other work on landslides in the general valley area.

6) What date was the investigation into the afore mentioned area authorised and by who's instigation?

We understand that in winter/spring 2016/2017 an enquiry was received by the NPTCBC Director of Environment from the Cabinet Member for education. This was in relation to the safety of Godre'graig School in light of the findings of the work in Pantteg. This work was expanded to include the Ty Gwyn and Cilmaengwyn landslides (close to Godre'graig).

7) If a retaining wall, acting as a defence for the school would require an "early warning system" then why would a retaining wall built to replace the school - which we are told is currently protecting the houses below - not require an early warning system?

We are unclear on the comment regarding an early warning system (BH). We do not consider a landslide barrier/engineered solution to protect the school is a technically feasible option as discussed above and in previous reports.

In relation to a scenario where the school is removed: There are 12 residential houses located immediately downslope of the primary school, on the opposite site of Graig Road. The houses are located further from the Quarry Spoil Tip and there are no gardens between the Quarry Spoil Tip and houses. On this basis, a failure of the Quarry Spoil Tip has been assumed to cause minor damage to these residential properties and some risk mitigation measures will be required.

Should a decision be taken to demolish the school building a potential solution to reduce the risk to the residential houses is to incorporate some landslide protection, either in the form of a barrier or bund (not wall) on the lower and

level area of the school site. A possible outcome could be to use the (processed) demolition arisings of the school to create an engineered bund/barrier; this would need to be designed and include adequate factors of safety and 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 damage/risk to residential houses would be lowered, and it can be assumed that little damage would occur. Assuming little damage were to occur, and a ‘possible’ likelihood, the risk to the residential houses would be very low (presumed acceptable to NPTCBC). Based on similar studies, the risk to traffic and pedestrians is likely to be lower due to the transience.