

DMQTWB 28 - Evidence from: British Geological Survey

Senedd Cymru | Welsh Parliament

Pwyllgor Newid Hinsawdd, yr Amgylchedd a Seilwaith | Climate Change, Environment, and Infrastructure Committee

Bil Tomenni Mwyngloddiau a Chwareli Nas Defnyddir (Cymru) | Disused Mine and Quarry Tips (Wales) Bill

1. What are your views on the general principles of the Bill, and is there a need for legislation to deliver the stated policy intention?

The British Geological Survey is a world-leading geological survey and global geoscience organisation, focused on public-good science for government and research to understand earth and environmental processes. We are the UK's premier provider of objective and authoritative geoscientific data, information and knowledge to help society to use its natural resources responsibly, manage environmental change and be resilient to environmental hazards. BGS has undertaken work on coal tips since the 1970s and was designated a World Centre of Excellence in Landslide Disaster Reduction by the International Consortium on Landslides in 2023. BGS has also been involved in technology trials for the Welsh Government using electrical resistivity tomography and InSAR for monitoring mine tips at Wattstown.

From our work, we recognise the geological risks associated with coal tips, particularly in the context of a changing climate affecting processes that drive slope instability, and therefore welcome the proposed legislation.

In addition to the proposals outlined in the Bill, we suggest that further consideration is given to the risks posed by naturally occurring ground instabilities (e.g. landslides, river scour and soluble rocks) and interactions with other natural hazards (e.g. flooding, see Winter et al., 2016, <https://doi.org/10.1016/j.proeng.2016.06.168>). Certain geologies are particularly prone to such risks, and we have mapped areas where such natural risks occur – see <https://www.bgs.ac.uk/geology-projects/shallow-geohazards/>; <https://www.bgs.ac.uk/datasets/bgs-geoscur-open/>; <https://www.bgs.ac.uk/datasets/geosure/>). Specifically we recommend that information addressing naturally occurring geohazards, and the potential for multi-hazard impacts (multiple hazards interacting) is considered as part of tip risk assessments and documented in the additional information components of

the tip register and any management plans. We note that this is recommended as additional criteria in the Regulating Coal Tip Safety in Wales Report section 6.44. Note that landslides are a particular concern in the South Wales Coalfield with 1,066 landslides currently documented in the BGS National Landslide Database (<https://www.bgs.ac.uk/geology-projects/landslides/national-landslide-database>); See also Conway, 1980, South Wales Coalfield Landslip Survey: Institute of Geological Sciences. Engineering Geology Unit, Report WN/EG/80/004; Bentley et al., 1990, [https://doi.org/10.1016/S0016-7878\(08\)80205-2](https://doi.org/10.1016/S0016-7878(08)80205-2); /).

We further advise that explicit consideration is given to risks of environmental contamination (of soil, surface water and groundwater bodies) from disused tips in the event of collapse or changes to drainage conditions, including for 'stable' tips (e.g. Szczepanska and Twardowska, 1987 <https://doi.org/10.1016/B978-0-444-42876-9.50026-9>; Palumbo-Roe, B and Colman, 2010, <https://nora.nerc.ac.uk/id/eprint/10083/>).

Such risks may be aggravated by climate change and though there is mention of climate change impacts within in the Explanatory Memorandum, there is no explicit provision within the Bill for incorporating future climate change impacts within the tip assessment and monitoring processes (e.g. Netherwood, 2021, <https://www.ukclimaterisk.org/wp-content/uploads/2021/06/CCRA-Evidence-Report-Wales-Summary-Final.pdf>; Climate Change in Wales Health Impact Assessment: D5.7 Landslides and coal Tips, <https://phwwhocc.co.uk/wp-content/uploads/2023/07/D5.7-Landslides-and-Coal-Tips-Eng-final.pdf>). We recommend that consideration is given to including provision for evaluating tip stability under different climate scenarios as part of the assessment and monitoring process.

We note that the current provision for assessment focuses on the land upon which the tip is situated. As tip failures often extend beyond the immediate location of the tip, we recommend that explicit reference is made within the Bill to land, property and people, in the vicinity of the tip that could be affected in the event of a tip failure. This should be included as part of tip risk assessments and documented in the additional information components of the tip register and any management plans.

We further note that, while management plans are mentioned within the Explanatory Memorandum, the Bill does not make any specific mention of these and does not require them to be produced. We recommend that the criteria for establishing a management plan (i.e. for what category and whether these should

be tip specific, or more general), who is responsible for initiating and reviewing them, and the time frames involved, should be stated clearly within the Bill

2. What are your views on the Bill's provisions (set out according to Parts below), in particular are they workable and will they deliver the stated policy intention?

▪ Part 1 - The Disused Tips Authority for Wales (sections 1 to 5 and Schedule 1)

▪ Part 2 - Assessment, registration and monitoring of disused tips (sections 6 to 32 and Schedule 2)

To comprehensively answer this question we would require more detailed information on how tips have been assessed, including the pre-defined risk categories and how they will be assessed in future, including what monitoring technologies will be used and the frequency for both assessments and monitoring. Given the large number of tips on the register, a tiered approach to assessment and monitoring could be the optimal and viable solution.

We recommend that the Bill provide explicit provision for a transparent and recognised risk-based approach that considers the magnitude of the hazard, the elements exposed to the hazard (people, buildings, infrastructure and sensitive environmental receptors) and the vulnerability of these elements to the hazard. The risk assessment could be based on a quantitative or a qualitative approach depending on the availability of data and tip category (e.g. Dai et al., 2002, [https://doi.org/10.1016/S0013-7952\(01\)00093-X](https://doi.org/10.1016/S0013-7952(01)00093-X); Cascini, 2008, <https://doi.org/10.1016/j.enggeo.2008.03.016>; Cardona et al., 2012, https://www.ipcc.ch/site/assets/uploads/2018/03/SREX-Chap2_FINAL-1.pdf). The rigour of the risk analysis should also be commensurate with tip category, with greater effort given to the assessment of risk presented by tips in the highest categories. This could include numerical modelling of slope stability and likely runouts, consideration for multi-hazard and cascading-hazard events (e.g. Al Heib et al., 2023, <https://doi.org/10.3390/su15108139>) and potential impacts under different future climate scenarios (e.g. Forzieri et al., 2016, <https://doi.org/10.1007/s10584-016-1661-x>).

For monitoring low and intermediate risk category tips, we would encourage the committee to consider Earth Observation data analysis for both regional- and site-scale surface monitoring of ground deformation (for example see Festa et al., 2023; <https://doi.org/10.1016/j.jag.2023.103276>; Medici et al., 2025, <https://doi.org/10.1016/B978-0-12-823868-4.00005-2>). This could be coupled with ground instrumentation to support ground deformation measurements from space (e.g. Kelevitz et al., 2022; <https://doi.org/10.3390/rs14122836>).

For monitoring higher risk categories, Earth Observation data analysis combined with subsurface in situ monitoring, inspection, sampling and testing could be used for site-specific tips (for example see Chambers et al., 2024, <https://doi.org/10.5194/egusphere-egu24-13082>; Watlet et al., 2024, <https://doi.org/10.1088/1748-9326/ad8fbc>, Ngui et al., 2024, <https://doi.org/10.5194/egusphere-egu24-11299>).

For monitoring the highest risk category tips, early warning systems can be considered to identify potential failures in advance of catastrophic collapse (e.g. Segoni et al., 2018 and references therein, https://nhess.copernicus.org/articles/special_issue896.html; Mirmazloumi et al., 2023; <https://link.springer.com/article/10.1007/s10064-023-03388-w>).

Earth Observation data analysis could also be applied for monitoring and assessing environmental impacts (e.g. Flemming and Marsh, 2005, https://old.earsel.org/workshops/IS_Warsaw_2005/papers/Minning_Environment/40_Fleming_381_388.pdf; Risqi et al., 2025, <https://doi.org/10.1016/j.rse.2024.114584>).

As risk changes over time as a result of changes in seasonal rainfall, climate and land use/management, we recommend that specific provision is made for a minimum frequency of periodic review of risk assessments and monitoring procedures (e.g. annually, following any significant events, or changes in land use/management) and identifies a procedure for independent third-party review of risk assessments and monitoring to ensure adequate and proportionate risk mitigation

▪ **Part 3 - Dealing with tip instability and threats to tip stability (sections 33 to 54 and Schedule 3)**

Under Chapter 2 – Operations Carried Out by the Authority, additional explicit reference could also be made to ‘Authorised Persons’ such that contractors are able to carry out operations on any land if necessary. Contractors and subsidiaries are usually involved in remediation or monitoring works of coal tips, on behalf of

the Authority. By explicitly stating this within the Bill, the Rights to Act on behalf of the Authority to perform such duties will be more apparent when attempting to resolve, or mitigate potential for, disputes.

Additionally, a clear and transparent reporting mechanism marketed for the public to report queries or concerns around stability of coal and non-coal tips will empower local community and foster engagement and cooperation in, for example, future community-led projects around slope safety. This can build on that which is already established for coal tips i.e. <https://www.gov.wales/coal-tip-safety-contact-details>.

- **Part 4 - Supplementary (sections 55 to 70)**

- **Part 5 - General (sections 71 to 88)**

3. What are the potential barriers to the implementation of the Bill's provisions and how does the Bill take account of them?

4. How appropriate are the powers in the Bill for Welsh Ministers to make subordinate legislation (as set out in Chapter 5 of Part 1 of the Explanatory Memorandum)

5. Are any unintended consequences likely to arise from the Bill?

6. What are your views on the Welsh Government's assessment of the financial implications of the Bill as set out in Part 2 of the Explanatory Memorandum?

7. Are there any other issues that you would like to raise about the Bill and the accompanying Explanatory Memorandum or any related matters?

To improve clarity of the document, we recommend that references to hazard and risk categories are referenced back to Figure 3 in the Explanatory Memorandum. We also note some disparity between the memorandum and the Bill, referring A-D in earlier texts and Categories 1-4 in the Bill.

Furthermore, the memorandum could signpost links to overlapping legislation and guidance that fall under Natural Resources Wales, e.g. contaminated land and controlled water quality, which would have relevance to any remediation proposals and management.
