



Coal Tips



Coal Tips

- Coal tip stability is a crucial issue in South Wales, where the legacy of coal mining has left a lasting impact on the landscape.
- Coal tips, also known as spoil heaps or slag heaps, are mounds of waste material created during coal extraction.
- These tips, often located on steep hillsides in the valleys, pose a significant risk of instability, particularly in areas like South Wales, which has a long history of coal mining



History

- **South Wales was once a hub of coal production during the Industrial Revolution and throughout the 19th and 20th centuries.**
- **The South Wales Coalfield provided fuel for industries across the UK and beyond, resulting in a vast amount of waste material from coal extraction.**
- **This waste, composed of shale, mudstone, sandstone, and coal fragments, was piled into coal tips near mining communities, often with little regard for long-term stability or environmental impact.**



History

- By the mid-20th century, many of these coal tips had become prominent features in the landscape, often built on steep slopes or unstable ground.
- The spoil heaps were subject to erosion, subsidence, and landslides, especially during periods of heavy rainfall, leading to concerns about their stability.



Aberfan

- The most infamous coal tip failure occurred in Aberfan on October 21, 1966. After days of heavy rain, Tip No. 7, located above the village, became saturated and collapsed, sending a torrent of slurry down the hillside.
- The landslide engulfed Pantglas Junior School and several nearby houses, killing 144 people, including 116 children.



Aberfan

- The Aberfan disaster brought the issue of coal tip stability to national attention. Investigations revealed that the tip had been sited on a spring and that its instability had been exacerbated by the accumulation of water.
- Following Aberfan, significant reforms were implemented to improve coal tip safety, but the legacy of coal mining continues to pose risks in South Wales.



Coal Tip Stability

Coal tip stability is influenced by a range of factors, particularly related to the geological, hydrological, and environmental conditions in South Wales. Key factors include:

Coal Tip Stability

1. Geology and Topography

- The South Wales Coalfield is characterised by steep valleys and hilly terrain, with many coal tips located on or near hillsides.
- The geology of the region, including layers of sandstone, shale, and coal seams, can also influence the stability of tips.

Coal Tip Stability

2. Hydrology and Water Accumulation

- Water infiltration is a critical factor in coal tip failures.
- Water can build up within spoil heaps, particularly if drainage is poor or if the tip is located on or near springs. Pore water pressure builds up within the tip, reducing the friction between particles and leading to a loss of shear strength, which can trigger landslides.
- In addition, clay-rich materials within the spoil heaps can absorb water, further increasing the risk of instability.

Coal Tip Stability

3. Poor Construction Practices

- Historically, coal tips were often constructed without proper engineering principles.
- Many tips were also overloaded, with large amounts of waste being added without considering the structural integrity of the existing tip.
- The irregular shape and distribution of spoil within tips also contributed to differential settlement and internal movement, making them more prone to collapse.

Coal Tip Stability

4. Vegetation and Erosion

- The presence or absence of vegetation can affect tip stability. Vegetation helps to stabilise slopes by holding the soil together with its root systems.
- Rainwater runoff can wash away loose material from the surface of the tip, particularly in areas with steep slopes.

Coal Tip Stability

5. Seismic Activity and Ground Vibrations

While South Wales is not known for significant seismic activity, even small tremors or ground vibrations (such as those from nearby industrial activities or traffic) can contribute to coal tip instability.

Coal Tip Stability Monitoring and Management

In the wake of the Aberfan disaster and subsequent coal tip failures, the UK government and local authorities introduced stricter regulations and monitoring practices to ensure the stability of remaining spoil heaps.

Current approaches include:

Coal Tip Stability Monitoring and Management

1. Regulation and Legislation

- In response to the Aberfan disaster, the Mines and Quarries (Tips) Act 1969 was introduced to regulate the construction and maintenance of coal tips in the UK.
- Local authorities and the Coal Authority are now responsible for the inspection, maintenance, and remediation of old coal tips.

Coal Tip Stability Monitoring and Management

2. Slope Stability Monitoring

- Modern monitoring techniques, such as InSAR, LiDAR, and GNSS, are used to monitor ground deformation and detect any early signs of instability in coal tips.
- Inclinometers and piezometers are installed in some areas to measure ground movement and water pressure within spoil heaps, providing data that can be used to assess the risk of collapse.
- Photogrammetry and drone surveys are also used to create detailed 3D models of coal tips, allowing for accurate monitoring of surface changes over time.

Coal Tip Stability Monitoring and Management

3. Remediation and Stabilisation:

- Efforts to stabilise coal tips include regrading steep slopes, installing drainage systems to prevent water accumulation, and adding vegetation to reduce erosion and surface runoff.
- In some cases, coal tips are completely removed or relocated if they are deemed to be at high risk of failure.

Coal Tip Stability Monitoring and Management

4. Community Engagement and Risk Awareness

- Following the traumatic legacy of coal tip failures, communities in South Wales are more aware of the risks associated with spoil heaps.
- Emergency response plans have been developed for communities living near coal tips, ensuring that there is a clear protocol for evacuation and response in the event of a tip failure.

Future Challenges

- As South Wales continues to manage the legacy of its coal mining past, there are growing concerns about the impact of climate change on coal tip stability.
- Additionally, the degradation of older drainage systems and infrastructure may further exacerbate the risk of coal tip failure.
- To address these challenges, there is a need for ongoing investment in monitoring and remediation efforts.

Future Challenges

Coal tips: Call for £60m a year to keep Wales' tips safe

🕒 28 September 2021 · 💬 316 Comments

Almost 300 tips were revealed this year to be at "high-risk" by an investigation prompted by a landslip in Tylorstown caused by Storm Dennis.

Future Challenges

Illegal riding 'could cause coal tip landslides'

Illegal off-road vehicles could damage coal tips and potentially cause dangerous landslides, fear officials at the local authority with the highest number of sites in Wales.

Future Challenges

Coal tips in Wales: New maps reveal 350 sites most at risk

🕒 14 November 2023

The taskforce, set up by the Welsh government, includes the Coal Authority local councils and Natural Resources Wales (NRW).

Old tips are graded according to risk, with 267 in category C needing an annual inspection and 83 in category D needing twice-yearly inspections.

The remaining 2,200 tips in categories A and B will need fewer checks, but inspections have also already started on tips in category B too.

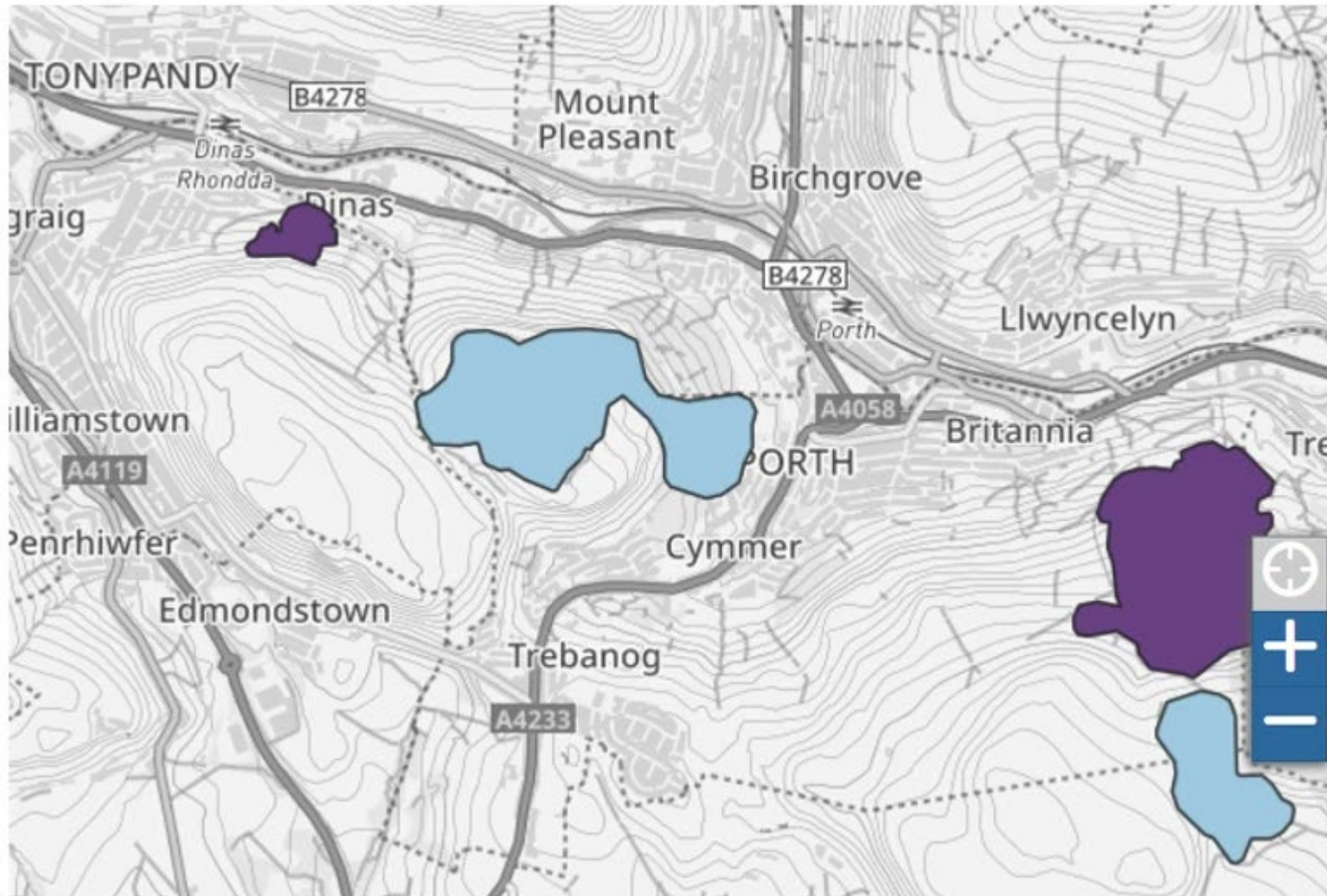
Future Challenges

About 800,000 homes to get disused coal tip advice

3 October 2025

About 800,000 homes and businesses across Wales are being leafleted as part of an awareness campaign around coal tip safety following two significant landslides in recent years.

Future Challenges



Future Challenges

Where are the old coal tips getting priority inspections?

Numbers of old tips - by category and local authority area

Local council	Category C	Category D	Total C & D
Blaenau Gwent	13	5	18
Bridgend	36	6	42
Caerphilly	44	7	51
Cardiff	1	1	2
Carmarthenshire	1		1
Merthyr Tydfil	44	15	59
Monmouthshire	10	2	12
Neath Port Talbot	28	13	41
Pembrokeshire	1		1
Powys	1		1
Rhondda Cynon Taf	50	29	79
Swansea	5		5
Torfaen	30	5	35
Wrexham	3		3
Wales Total	267	83	350

Category C will get annual inspections and category D will get twice-yearly inspections

Source: Coal Tip Safety Taskforce, Welsh government, November 2023