Thirlmere Resilience



United Utilities

Water for the North West

Intro

- Matt Powell – Catchment Partnership Officer.





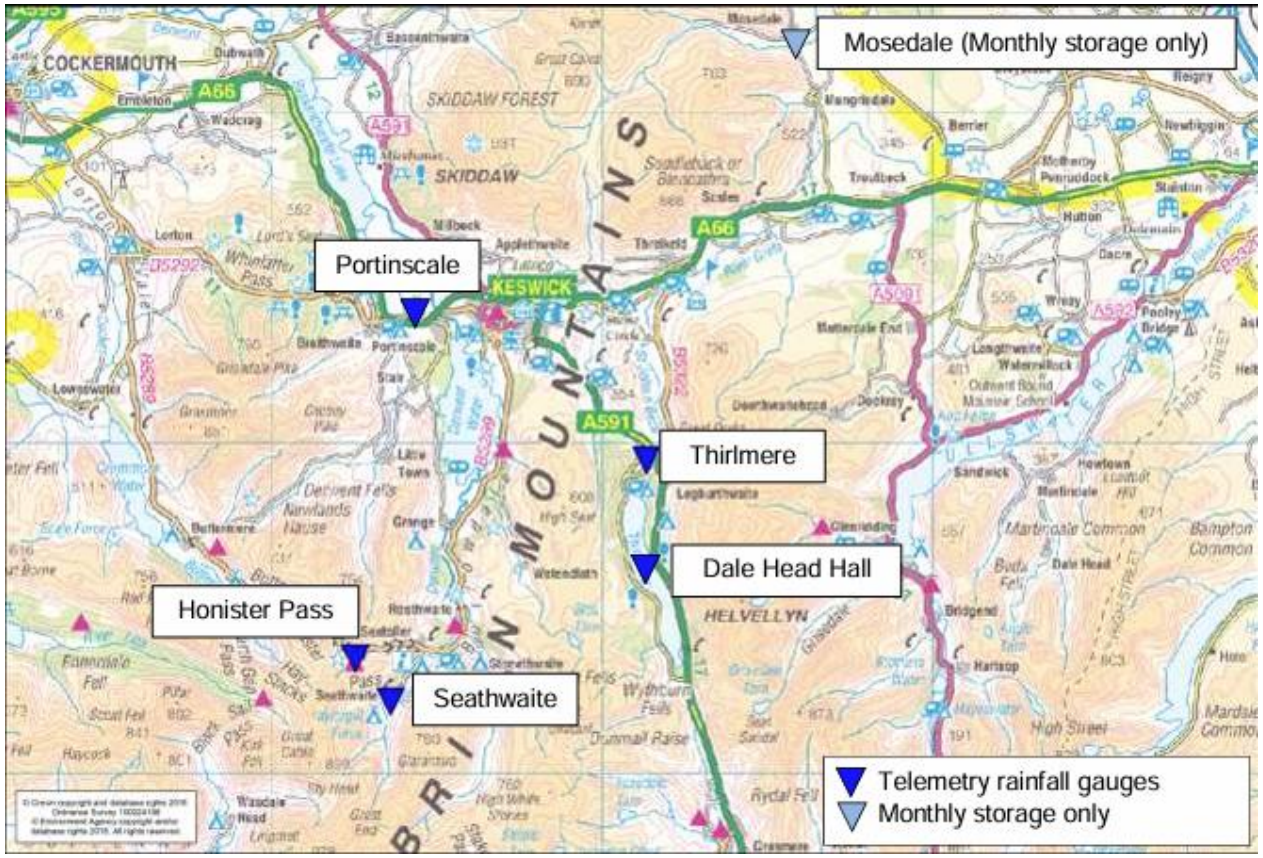
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Storm Desmond

The event

	Previous record			December 2015 Event	
	Date	Location	mm	Location	mm
24 hour rainfall	November 2009	Seathwaite	316.4	Honister Pass	341.4
48 hour rainfall	November 2009	Seathwaite	395.6	Thirlmere	405

	Rainfall (mm)			Estimated Return Period (AEP) of max. rainfall in 24 hours†
	4th December (09:00 – 08:59)	5th December (09:00-08:59)	Max. rainfall in 24 hours	
Honister Pass	58.6	294.4	341.4	**<0.1%**
Seathwaite	36.6	185.2	214	1.33%-1.67%
Thirlmere	35.0	317.6	324.8	**<0.1%**
Portinscale	Data not within validation tolerances			
Dale Head Hall	Data not within validation tolerances			
Mosedale	Monthly storage – no telemetry			



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Storm Desmond

The aftermath

All that rain ended up in the reservoir and brought with it a lot of the catchment.

Turbidity rose from the average 0.5NTU to 44NTU.

Rendering Thirlmere in operable for days.







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Storm Desmond

Sediment sources

The catchment literally fell into the reservoir.

The A591 was washed away, disconnecting the valley.

Bits of the road can still be found on the reservoir margin.







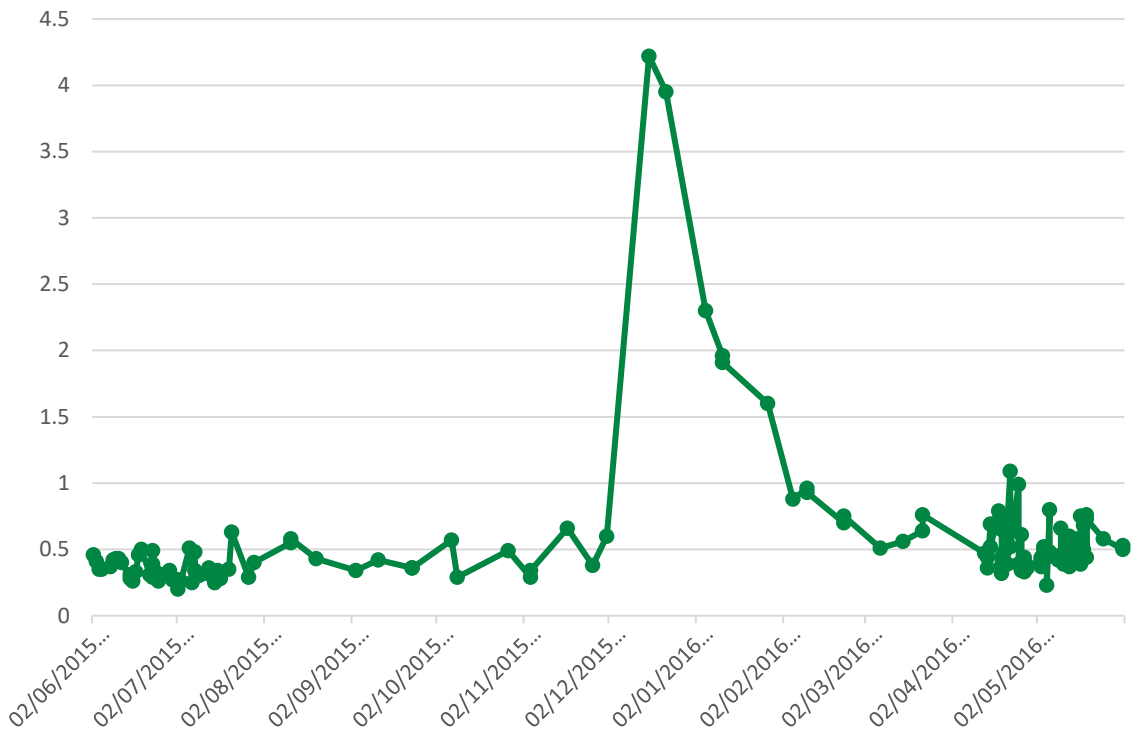


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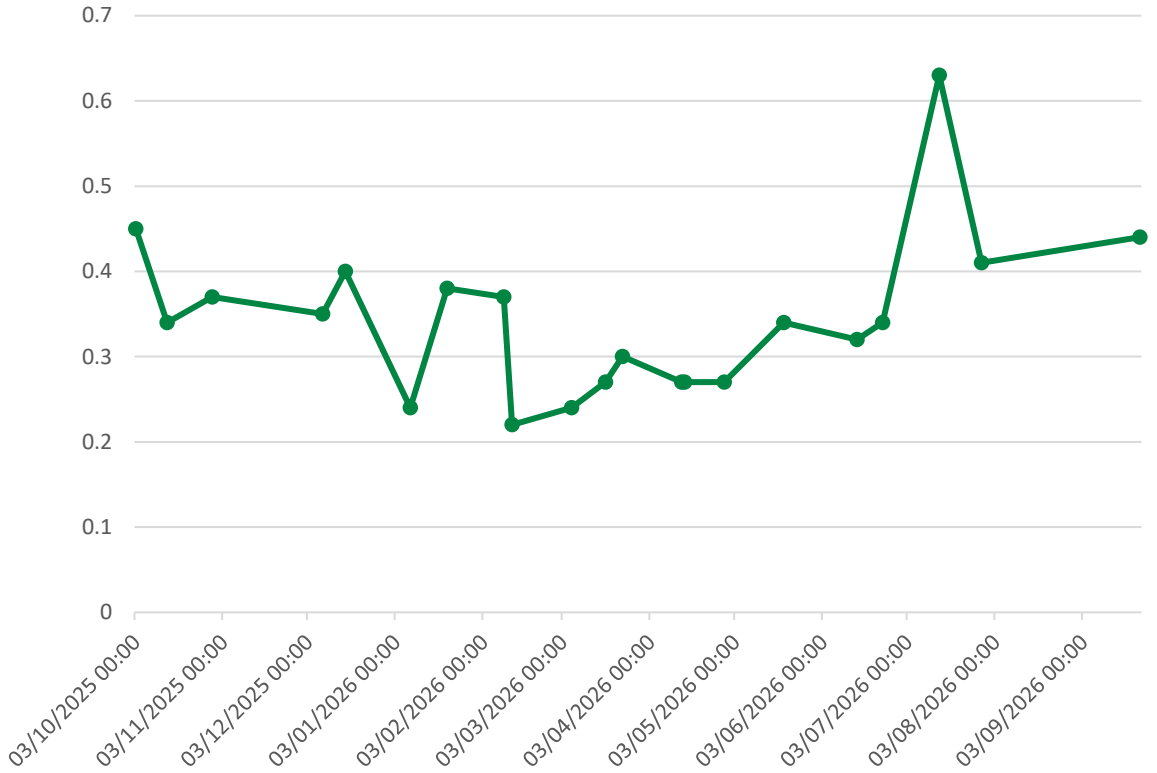
Turbidity comparison

Bridge End Raw Inlet 21330

2015/16



2025/2026



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Thirlmere Resilience

The beginning

dwi
guardians of drinking water quality

DRINKING WATER INSPECTORATE
Area 1A
Nobel House
17 Smith Square
London
SW1P 3JR

Enquiries: 030 0068 6400

E-mail: milo.purcell@defra.gsi.gov.uk
DWI Website: http://www.dwi.gov.uk

30 May 2018

Mr Steve Fraser
Managing Director
United Utilities Water Limited
1st Floor, Haweswater House
Lingley Mere Business Park
Great Sankey
Warrington
WA5 3LP

Dear Mr Fraser

PERIODIC REVIEW 2019: United Utilities
DWI Scheme reference: UUT07 – Thirlmere – Catchment Resilience

FINAL DECISION LETTER – COMMEND FOR SUPPORT

The Inspectorate has assessed the scheme proposed by United Utilities to improve the resilience of the catchment surrounding the Thirlmere raw water storage reservoir, especially to severe weather events.

Based on the information submitted by the company, the Inspectorate commends for support the proposals to deliver improvements to mitigate residual risks to the wholesomeness of water supplied to consumers, and we agree that the proposals should be included by the company in its Final Business Plan. We consider that formal enforcement action and putting in place a legal instrument is inappropriate at this stage. We confirm that the proposed scheme is consistent with the requirements of Defra's Strategic Policy Statement published in September 2017.

We also confirm that the proposed scheme is consistent with the Inspectorate's guidance on principles for the assessment of drinking water quality provisions within the PR19 process, as set out in DWI Information Letter 03/2017, published on 12 September 2017. In particular, we are satisfied that the proposed scheme adopts a sound risk based approach to management of water supplies from source to tap using a water safety plan approach.

The Inspectorate is prepared to review this decision should circumstances change significantly, or if new information becomes available.

The strategy at Thirlmere will include: -

- Restoration of natural processes (geomorphology and vegetation) to improve resilience and fully functioning catchment hydrology and vegetation. This includes: -
  - River restoration
  - Tree planting
  - Enabling natural regeneration to address soil compaction and improve flash flow management
- Landscape-scale changes to sustainable land management to benefit water quality and resilience, including working with Natural England as a key partner and enabler via agri-environment funding and its changing focus
- Catchment infrastructure enhancements
- Native woodland and scrub planting (Comb Gill)
- Increased slope stabilisation through improved vegetation structure
- Stream modification at Thirlmere IR and other infrastructure enhancements to deal with increased sediment flows
- Delivery of the recommendations from the Penny Anderson Report, detailed above (section 6a)



(i) (ii) (iii)

Figure 2: - Lake Thirlmere: (i) Aerial view showing the whole of the direct catchment; (ii) Aerial view in the aftermath of Storm Desmond close to the point of abstraction into the TA and (iii) a view of one of the landslides

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Subcatchment monitoring

Employed very big brains

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Monitoring approach



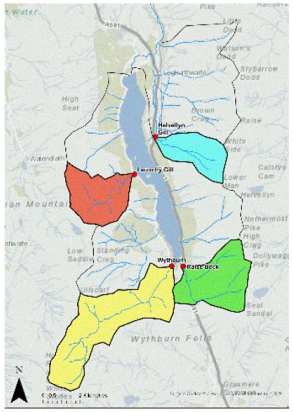
Water quality sensors: temperature, conductivity, DOC, NO3N, turbidity





Water level sensor: temperature, water depth

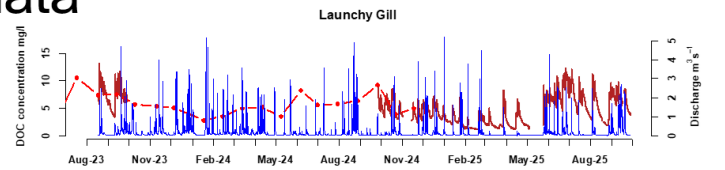


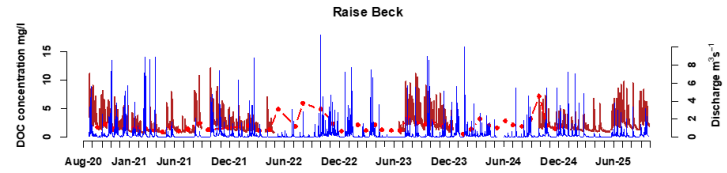


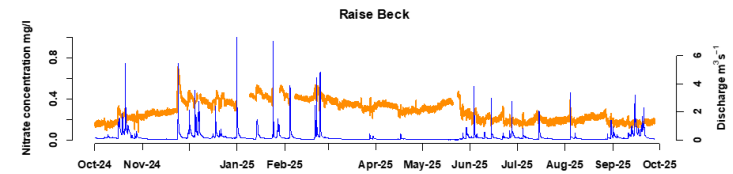
Sub-catchment data

High frequency stream measurements reveal short term events and seasonal patterns in DOC and nitrate across sites:

- DOC concentration peaks in summer and under high flow
- Nitrate concentrations peak in winter but show variable responses to high flow – sometimes increasing and sometimes decreasing



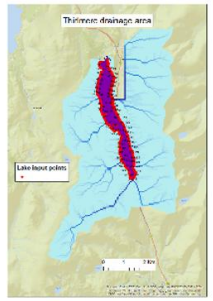


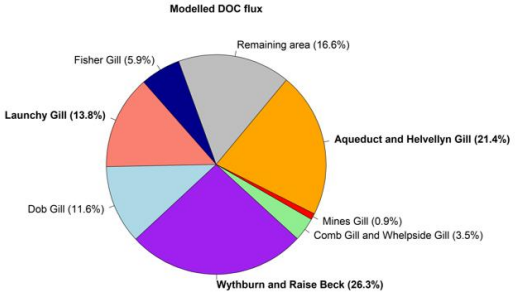


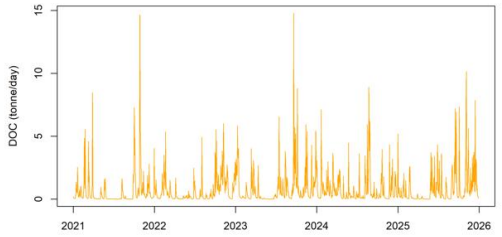
Scaling to whole catchment modelling for DOC

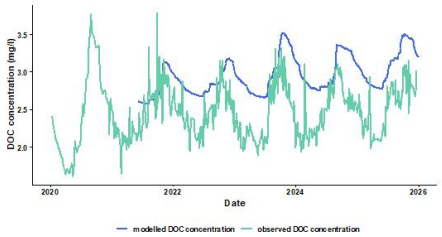
Concentrations and fluxes of DOC for the whole catchment:

- Combination of peat soils and hydrological load predict key contributing sub-catchments
- DOC flux varies from 233.1 to 323.4 tonnes p.a. (2021 – 2025)
- Mass balance lake model suggest some DOC processing occurs in the reservoir









Progress…

Livestock change

- In 2025, West Head Farm had 2,500 ewes + followers.
- In 2020, we bought the tenant out and reduced flock to 350 ewes + followers.
- Vegetation bounced back, making catchment rougher, slowing the flow of water.



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River restoration



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More river restoration…

Section 20
Site: United Utilities (part of West Head Farm).
Watercourse: St John's Beck & Mill Gill tributary.

Pressures on the river: Embankment and Bank reinforcements (drystone wall) over a 300m reach. Reduced sediment connectivity.

Actions:
(1) Remove existing drystone wall, replace with fence 10-15m back into the field (away from the river)
(2) Introduce cobble and boulder material to the channel
(3) Restore the Mill Gill confluence tributary fan

Potential effects:
Improved river-floodplain connectivity, sediment connectivity and in-channel habitat.

Progress:
Works completed in July 2025.



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Peat restoration

- Over 500ha peat has been restored across the estate.







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Forest restructuring

Tree planting and felling

- This AMP – 56,000 trees planted in year 1.
- 23 ha forest restructured.
- 8ha new woodland
- 2 nurseries for growing local provenance trees.











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What next…

(for the award winning Thirlmere Resilience)

- Got industry recognition in 2026.
- Looking to build on the current successes.
- Want to go harder and faster.







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