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History of the use of temporary barriers in England

- In 2004, Defra provided the EA with funding to trial metal framed temporary barriers to seek to better protect communities on the River Severn.
- Since then, the Environment Agency (EA) has considered using temporary flood barriers in places where permanent defences may prove too disruptive and technically or economically unviable.



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History of the use of temporary barriers in England

- In 2016, we procured more temporary flood defences of both metal framed and container type to increase the EA area and national stock up to 40km.



- We produced over 100 pre-planned Temporary Defence Deployment Plans (TDDP's) for deployment of the national stock at potential flood risk locations.

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British Standard 851188 : 2019

- BS851188 was published in October 2019. It sets out a testing regime for both Property Flood Resilience products and temporary barriers.

- The testing includes:

- Standing water
- Dynamic impact
- Waves
- Current
- Overflowing

- The temporary barriers should have a leakage rate of less than 40 l/h/m

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Sliding incidents at Ironbridge and Bewdley

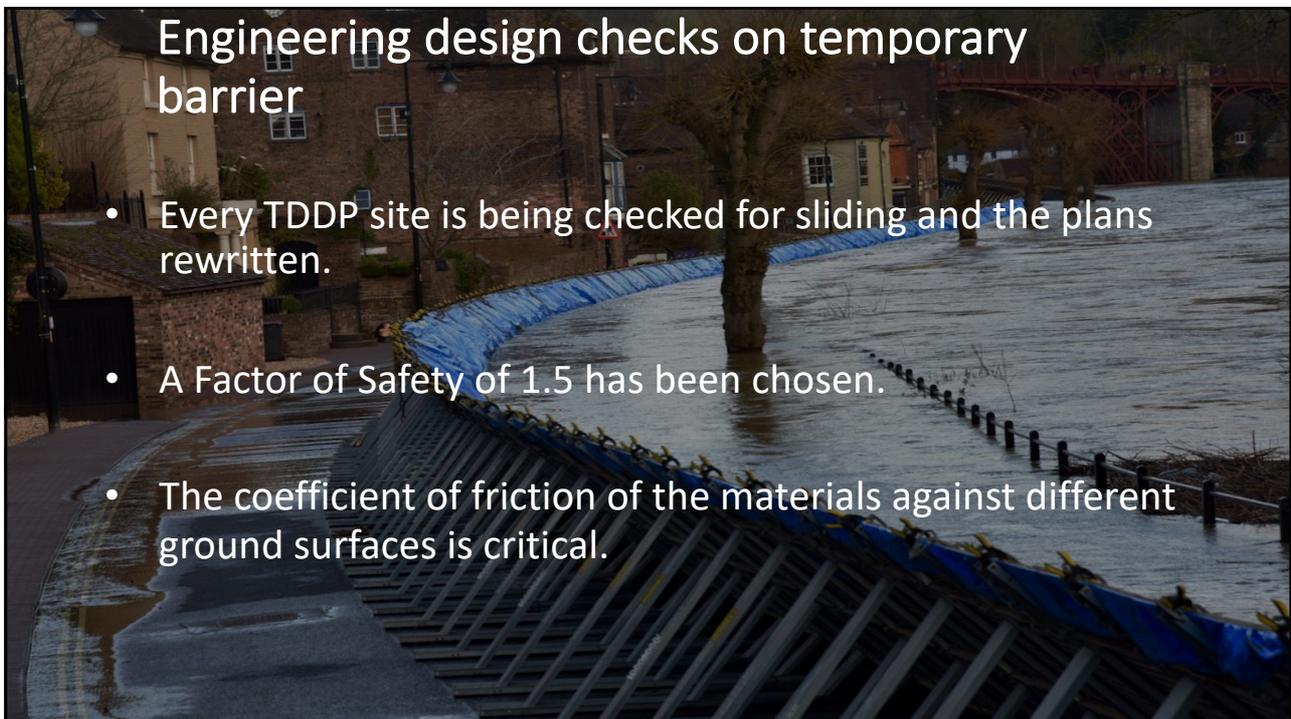
- In February 2020, a short section of the 1.8m high temporary barriers at Ironbridge on the River Severn slid when they were loaded with over 1.7m of flood water.
- In January 2021, as the 1.2m high temporary barriers at Beales Corner, Bewdley were about to overflow, a section of barrier slid.



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Engineering design checks on temporary barrier

- Every TDDP site is being checked for sliding and the plans rewritten.
- A Factor of Safety of 1.5 has been chosen.
- The coefficient of friction of the materials against different ground surfaces is critical.



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BS5975 Table 25

Table 25 — Recommended values of coefficient static friction μ

SURFACE 1		Steel				Aluminium	Timber					Plywood				Concrete	
		Plain unru- sted	Plain rus- ted	Galva- nized	Propri- etary paint- ed	Proprietary waling	Soft wood		Hard wood		Propri- etary beam	Good one side	Combi ply faced	Film faced Finnish	Film faced quality	Cast face	
Steel	Plain unru- sted	0.3	0.4	0.3	0.3	0.2	0.3	0.4	0.4	0.5		0.5	0.3	—	—	0.1	<i>0.1</i>
	Plain rus- ted	0.4	0.4	0.3	0.6	0.3	—	—	0.6	—	0.4	0.3	0.2	0.2	0.2	—	
	Galvanized	0.3	0.3	0.2	0.4	0.2	0.4	0.5	0.5	0.5	0.4	0.2	—	—	0.1	—	
	Proprietary painted	0.3	0.6	0.4	0.7	0.4	0.4	0.4	0.4	0.5	0.5	0.4	0.2	0.2	0.1	<i>0.0</i>	
Aluminium	Proprietary waling	0.2	0.3	0.2	0.4	0.2	0.4	0.4	0.4	0.3	0.2	0.2	0.2	0.2	0.1	—	
Timber	Softwood	Parallel	0.3	—	0.4	0.4	0.4	0.6	0.5	0.4	0.4	0.4	0.2	0.2	0.3	0.2	0.8
		Perpendicular	0.4	—	0.5	0.4	0.4	0.5	—	0.4	—	0.3	0.3	0.2	0.2	0.1	0.7
	Hardwood	Parallel	0.4	0.6	0.5	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.3	—	—	0.2	0.5
		Perpendicular	0.5	—	0.5	0.5	0.3	0.4	—	0.5	—	0.4	0.3	—	—	0.2	0.7
	Proprietary beam	0.5	0.4	0.4	0.5	0.2	0.4	0.3	0.4	0.4	0.5	0.3	—	—	0.1	—	
Plywood	Good one side	0.3	0.3	0.2	0.4	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.3	
	Combi ply faced	—	0.2	—	0.2	0.2	0.2	0.2	—	—	—	0.2	—	—	—	0.3	
	Film faced Finnish	—	0.2	—	0.2	0.2	0.3	0.2	—	—	—	0.2	—	—	—	0.3	
	Film faced quality	0.1	0.2	0.1	0.1	0.1	0.2	0.1	0.2	0.2	0.1	0.2	—	—	0.2	0.2	
Hardened concrete	Cast face	<i>0.1</i>	—	—	<i>0.0</i>	—	0.8	0.7	0.5	0.7	—	0.3	0.3	0.3	0.2	<i>0.4</i>	
	Trowelled face	0.5	0.7	0.2	0.6	0.4	1.1	0.7	0.7	0.6	0.6	0.3	—	—	—	<i>0.4</i>	
Soil	Granular	0.3	—	—	0.3	—	0.3	0.3	0.3	0.3	—	—	—	—	—	<i>0.4</i>	

NOTE 1 Values of coefficients above the dotted line are symmetrical and location of component, whether member upper or lower, is not considered.

NOTE 2 Values shown in italics are based on BS 5975:1996 values and are not derived from The University of Birmingham research.

NOTE 3 Timber and plywood are considered to be either dry or in the saturated condition.

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HR Wallingford Surface Description	Equivalent Description	Standard Friction Coefficients		HR Wallingford Tested Average Friction Coefficients (Wet Surface)		
		Barrier	Membrane	Barrier A	Barrier B	Membrane
Cast Concrete	Concrete	0.4	0.2	0.72	0.77	0.32
Surface-dressed Tarmac	Asphalt	0.6	0.2	0.98	0.96	0.53
Hot Rolled Asphalt	Asphalt	0.6	0.2	0.86	0.74	0.39
Healthy Grass	Natural Ground	0.3	0.3	1.27	1.15	0.68
Stone/concrete paving slabs	Concrete	0.4	0.2	0.76	0.82	0.45
Compacted gravel/soil path	Natural Ground	0.3	0.3	0.55	0.47	0.57
Brick paviors	Concrete	0.4	0.2	0.75	0.88	0.43
Loose gravel	Natural Ground	0.3	0.3	0.68	0.71	0.61
Worn grass/soil	Natural Ground	0.3	0.3	1.28	1.18	0.47

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Kentledge



Low carbon concrete blocks of 250kg or 500kg mass.

Plastic containers made from recycled fishing nets. They can contain 300kg of water.



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