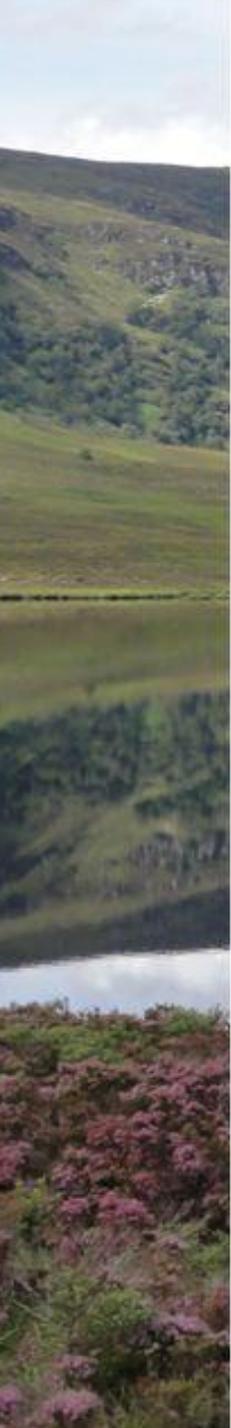


# Protecting groundwater from the ground – possible approaches

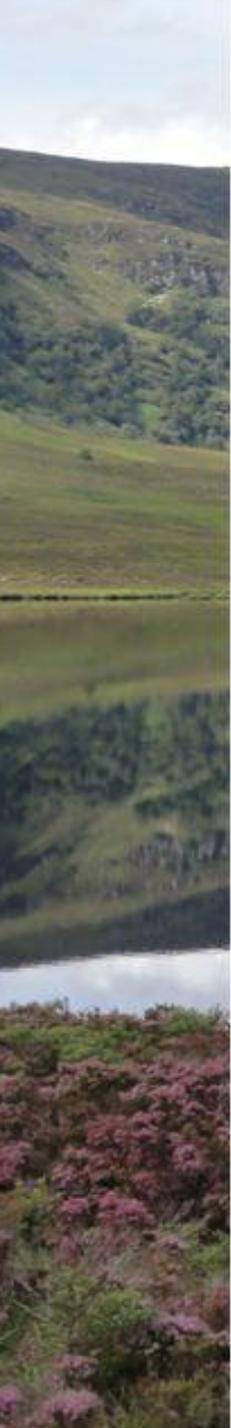
Dr John Heathcote

John Heathcote Consulting Ltd



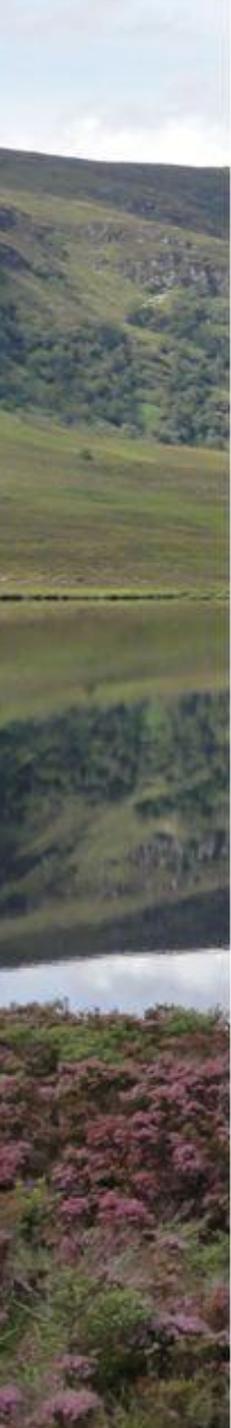
# Outline

- The essence of European legislation
- UK legal requirements
- What might be on the table
- How could it be different?
- Context
  - Contaminated land *in situ*
  - Contaminated land remediation



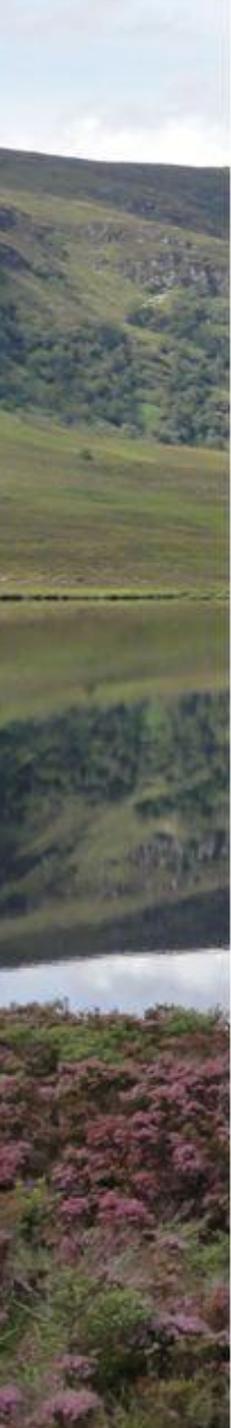
# The essence of EU legislation

- Definition of pollution and requirement to reduce and prevent pollution
- Definition of ‘groundwater’
- Prevent input of hazardous substances and limit input of other substances
- Exemptions for:
  - Permitted activities
  - Small quantities
  - Unforeseeable events
  - Disproportionately costly measures to remove pollutants from contaminated ground



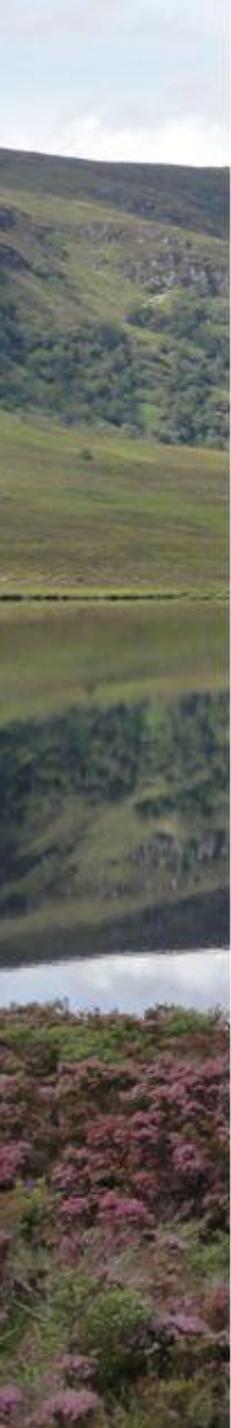
# UK requirements

- Offence in England+Wales to permit *poisonous, noxious or polluting matter* to enter into controlled waters except in compliance with a **Consent** (Water Resources Act, 1991)
- In Scotland, activities liable to cause pollution (WFD definition) of the water environment must comply with an **Authorisation** (Controlled Activities Regulations, 2011)
- Land causing significant pollution of controlled waters / water environment may be identified as **Part 2A Contaminated Land** (Environment Act, 1995)



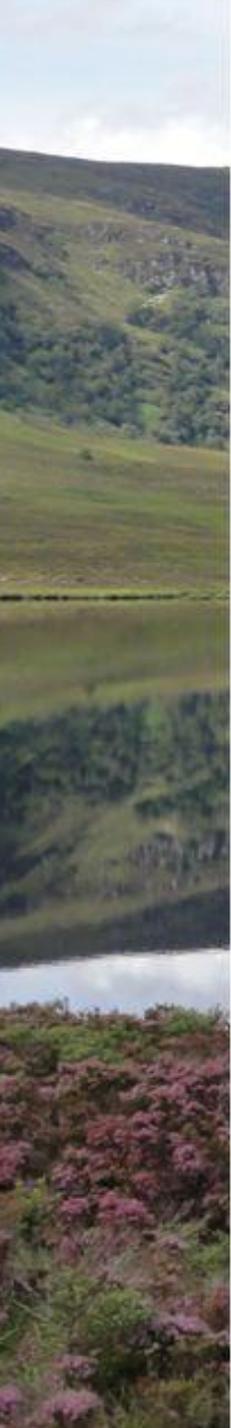
# Devolution

- Groundwater and contaminated land are environmental matters and thus are devolved
- WFD & GWDD are common, but:
  - Method of implementation in law differs;
  - Guidance is very different;
  - Effect of regime is different between England and Scotland.
- In the absence of WFD/GWDD, differences may increase
- **Is it advantageous / desirable to have different regimes across the UK?**



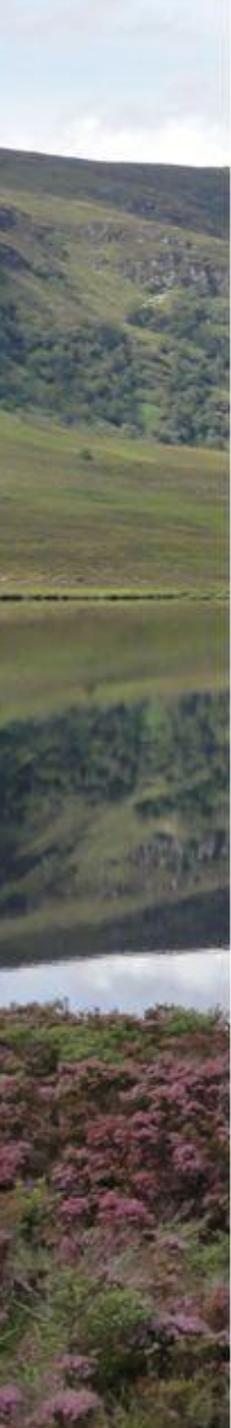
# What might be on the table?

- Definition of groundwater
- Definition of pollution
- Prevent and limit, exemptions and authorisations
  
- Requirement not to 'pollute' 'groundwater' will persist unless changed explicitly
- Definition of Contaminated Land in terms of groundwater pollution will persist unless changed explicitly



# What is groundwater?

- ‘All water which is below the surface of the ground in the saturation zone and in direct contact with the ground or sub-soil’
- Possible alternatives:
  - Any waters contained in underground strata (including unsaturated zone?) (WRA, 1991)
  - All water in aquifers / water bodies
  - All groundwater currently in use
  - All potable groundwater
  - All designated groundwater – how to designate?
  - ...
  - What about ‘permanently unusable’ groundwater (low permeability, naturally unfit, historically polluted)?



# What is pollution?

- Direct or indirect introduction, *as a result of human activity*, of substances into the water which may be harmful...
- Natural contamination is excluded
- Harm has a broader definition than in Part 2A



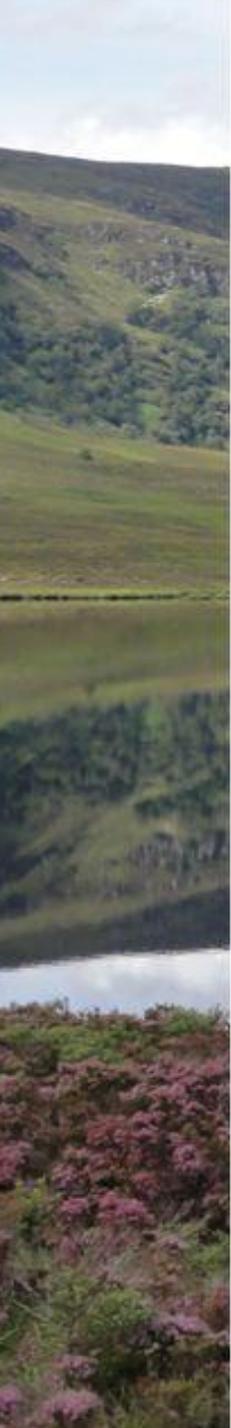
## WFD

- Human health
- Aquatic ecosystems or dependent terrestrial ecosystems
- Material property
- Interference with amenities
- Interference with legitimate use

## Part 2A

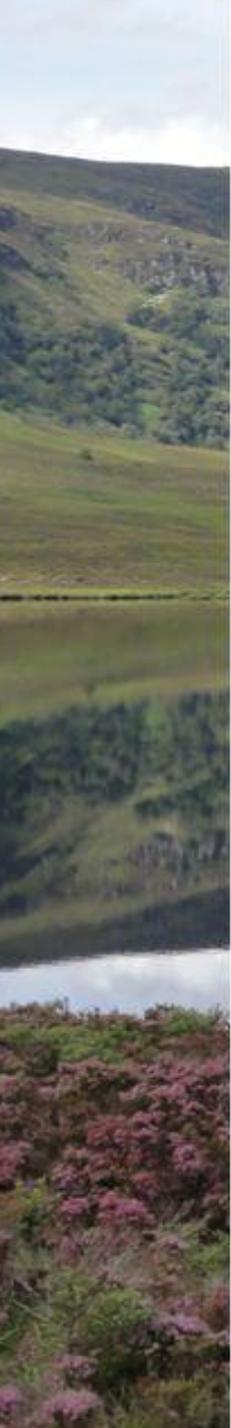
- Health of living organisms (human and non-human)
- Interference with ecological systems
- Harm to property
  
- **How should we define harm?**

# Harm



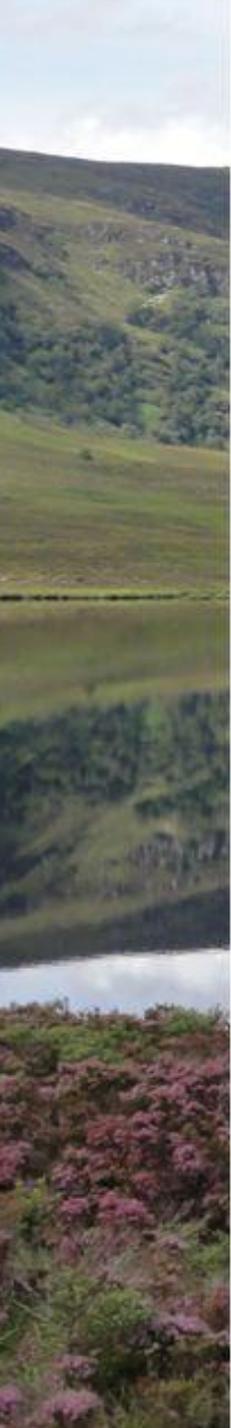
# Is the definition of pollution satisfactory?

- Natural contamination is excepted, even if it renders water unusable, but not necessarily if it renders land unusable
- What about adverse effects to groundwater from backfill with natural or recovered materials?
- What about pollution from land with no traceable culprit? Historic pollution?



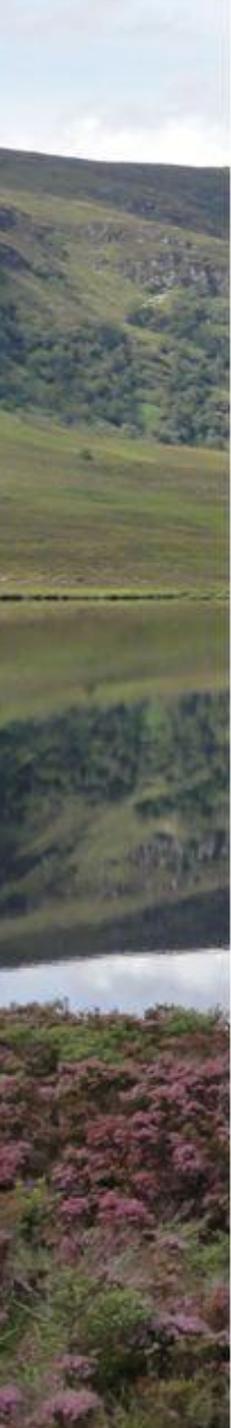
# Hazardous substances

- Entry to be prevented rather than limited
- Toxic, persistent and liable to accumulate
  - Terms quantified in REACH guidance
- Mutagenic or have no determinable threshold for adverse effects on human health
  - UK + Eire extension
  - Catches a very large number of substances + all radioactive substances



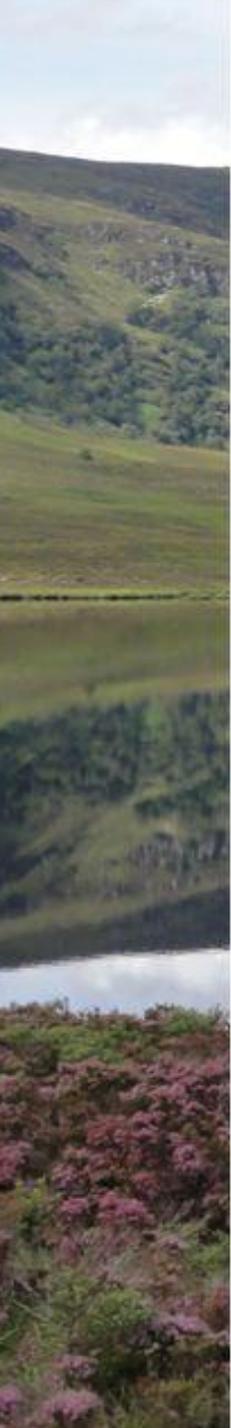
# All other substances

- Any other substance (other than water) can cause pollution
- Inputs must be limited so as to ensure no deterioration or sustained upwards trends in concentrations



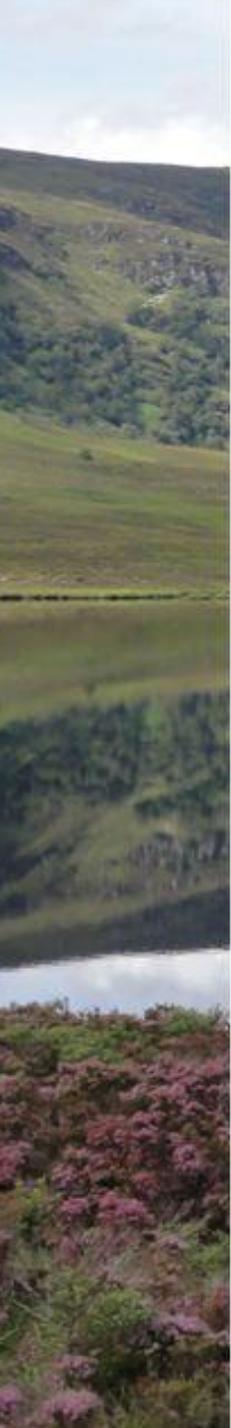
# Prevent, Limit

- Prevent
  - England – not discernible immediately after entry into groundwater
  - Scotland – not detectable immediately prior to entry into groundwater
- Limit
  - England – use-determined value in hydrogeological context
  - Scotland – use-determined value at appropriate assessment point
- **Do we need to define hazardous substances to be able to avoid pollution?**



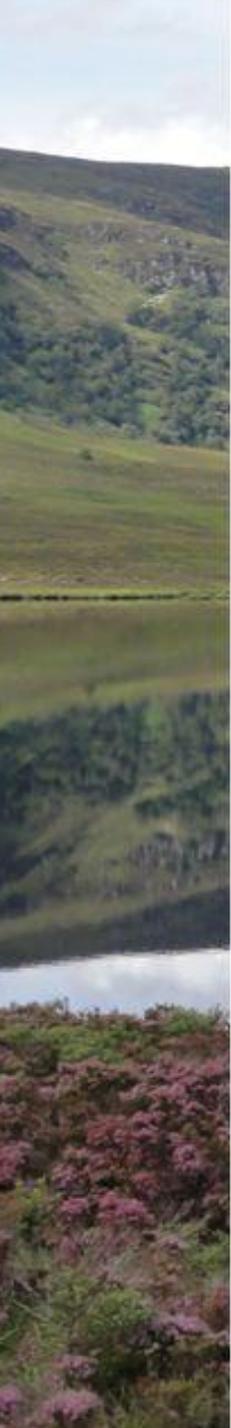
# Exemptions from measures to 'prevent and limit' (a)

- **Authorised direct discharges**
  - No issue?
  - Injection of remedial agents?
  - Leaching from infill?



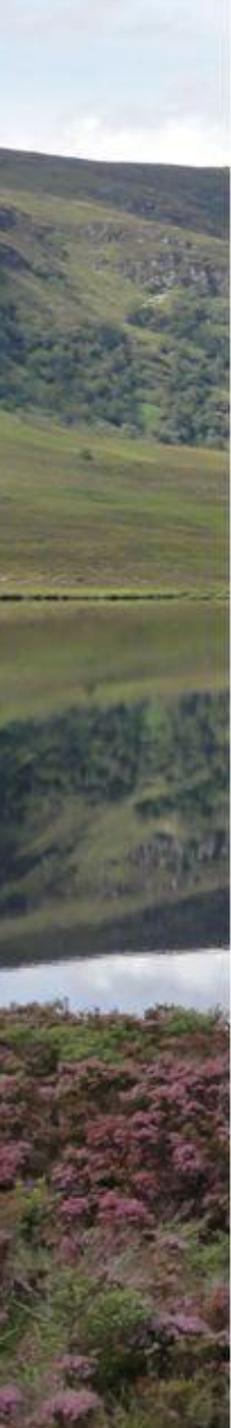
# Exemptions from measures to 'prevent and limit' (b)

- Quantity and concentration so small as to obviate any present or future deterioration in the quality of the receiving groundwater
  - Is this intrinsically reasonable in the context of 'prevent'?
  - How to define? Without evaluation (simple finding)?
    - Discernibility?
    - Example activities?
    - MRV?



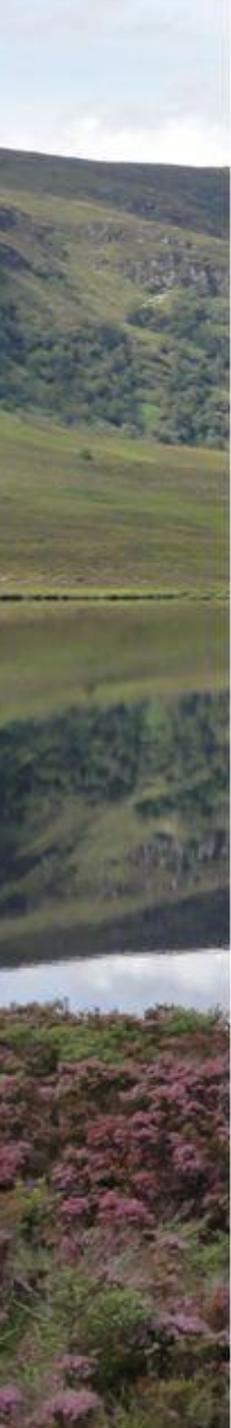
# Exemptions from measures to 'prevent and limit' (c)

- Unforeseeable events that could not reasonably have been mitigated (by good practice)
  - Surprises are not unknown during remedial work!
  - Do we want to keep this exemption? Clarify or strengthen?
  - Does good practice need formal definition?



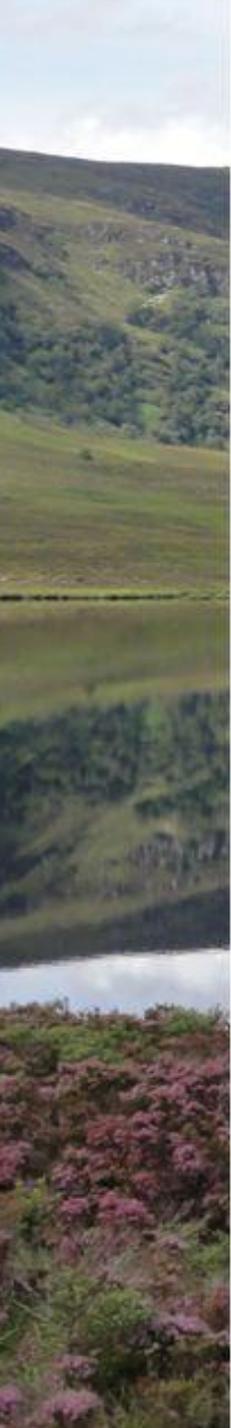
# Exemptions from measures to 'prevent and limit' (e)

- In the view of the competent authorities incapable, for technical reasons, of being prevented or limited without using:
  - i) measures that would increase risks to human health or to the quality of the environment as a whole; or
  - ii) disproportionately costly measures to remove quantities of pollutants from, or otherwise control their percolation in, contaminated ground or subsoil



# Exemptions from measures to 'prevent and limit' (e)

- In the view of the competent authorities incapable, for technical reasons, of being prevented or limited ...
  - (i) does not explicitly consider social and economic cost – usual practicability test
  - (ii)
    - EA does not expect to use this – achieve end in other ways
    - Scotland adopts a more relaxed end-point, but ONLY for Part 2A Contaminated Land, permitted sites are excluded
  - Should we draw a line under the past? How do we draw a line under the past? When does 'the past' become 'the present'?



# Summary of questions

- Protect groundwater from contaminated land?
- Devolved approach?
- How much groundwater to protect?
- What is pollution?
- Are hazardous substances different? Do we need to identify them?
- What is too small to matter?
- Pollution from unexpected events during investigation / remediation?
- Should the cost of remedial work be an explicit issue in determining clean-up standard?
- Does historic contamination need different arrangements?
- Do we need clear controls for treatment agents and backfill?
- **Is everything fine as it is?**



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