

# Considering climate change in controlled waters<sup>1</sup> risk assessment

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Controlled Waters

<sup>1</sup> Equivalent term in Scotland is the Water Environment. NIEA use both terms.

# The sub-group



# Presentation overview

- Aim of SoBRA guidance
- Legislation, policy and guidance
- Climate change in the UK
- Conceptualising climate change
- Considering climate change through the phases of land contamination risk assessment
- Example site
- Summary of key points

# SoBRA Guidance

*Aims to develop clear, practical guidance to support decisions about the potential effects of future climate change through all stages of*

environmentanalyst

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consequences within controlled waters risk assessments.

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SOCIETY OF BROWNFIELD RISK ASSESSMENT

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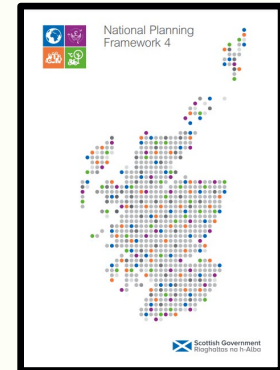
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# UK legislation, policy, guidance

- Land contamination:
  - Part IIA of the Environmental Protection Act 1990
  - Planning policy
- Climate change:
  - Climate Change Act (2008) and Climate Change (Scotland) Act (2009)
    - Climate Change Committee
    - UK Climate Change Risk Assessment every 5 years
      - Climate change adaptation plans



# UK legislation, policy, guidance

Guidance  
**LCRM: Before you start**  
Updated 20 July 2023

Environment Agency



**GPLC2 – FAQs, technical information, detailed advice and references**  
March 2010

BS EN ISO 21365:2020



BSI Standards Publication


Soil quality – Conceptual site models for potentially contaminated sites

bsi.

SEPA  
Scottish Environment Protection Agency  
Buidheamh Dìon  
Ainmearachd na h-Alba

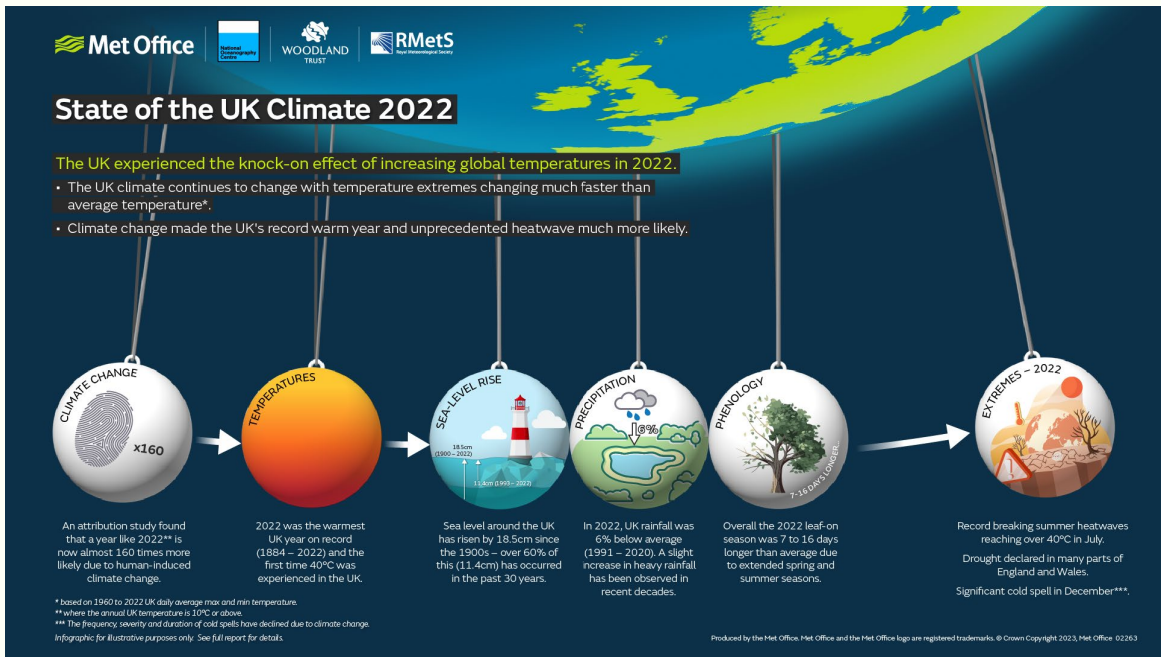
**WAT-PS-10 Assigning groundwater assessment criteria for pollutant inputs consultation**  
November 2020

Every day SEPA works to protect and enhance Scotland's environment, helping communities and businesses thrive within the resources of our planet.



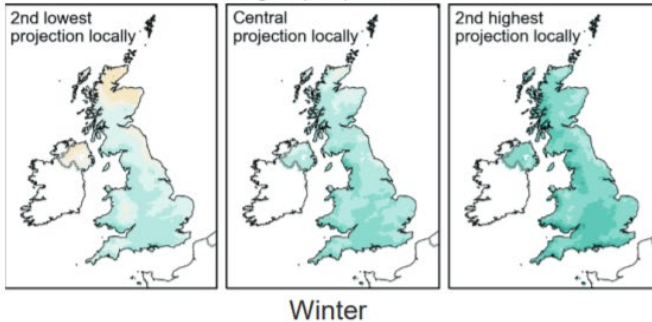
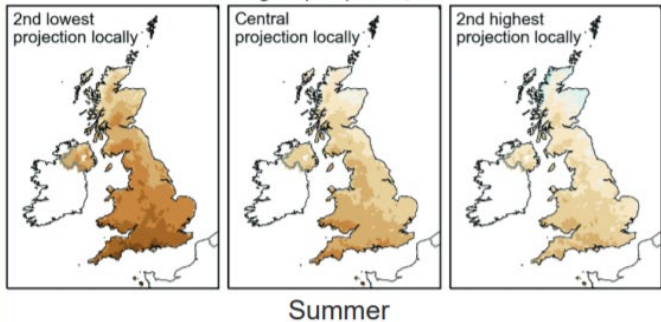
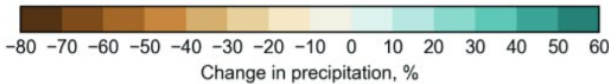
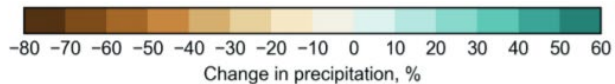
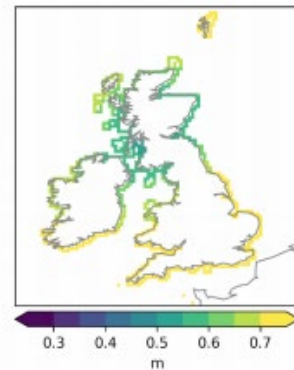
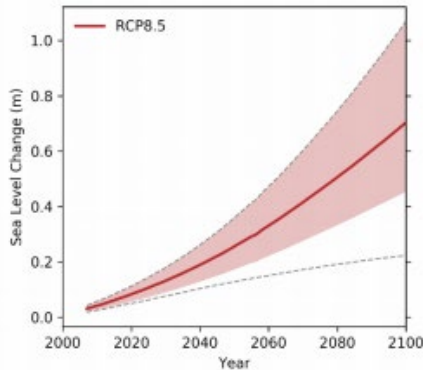
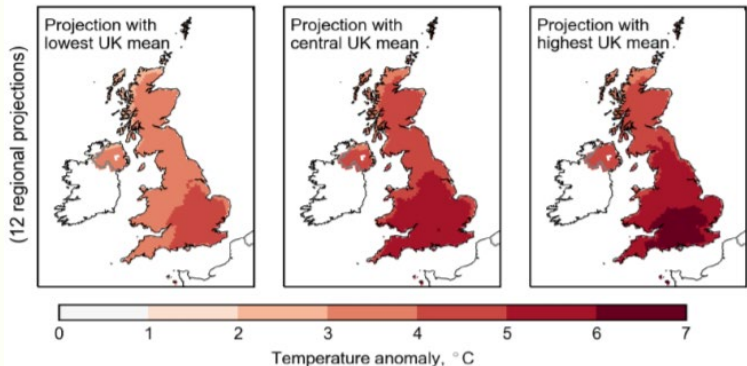
We call this One Planet Prosperity

# Climate change in UK – general overview



*Climate change is the large-scale, long-term shift in average weather patterns and average temperatures and is assessed by averaging data over a 30-year period.*

# Climate change in UK – regional variation

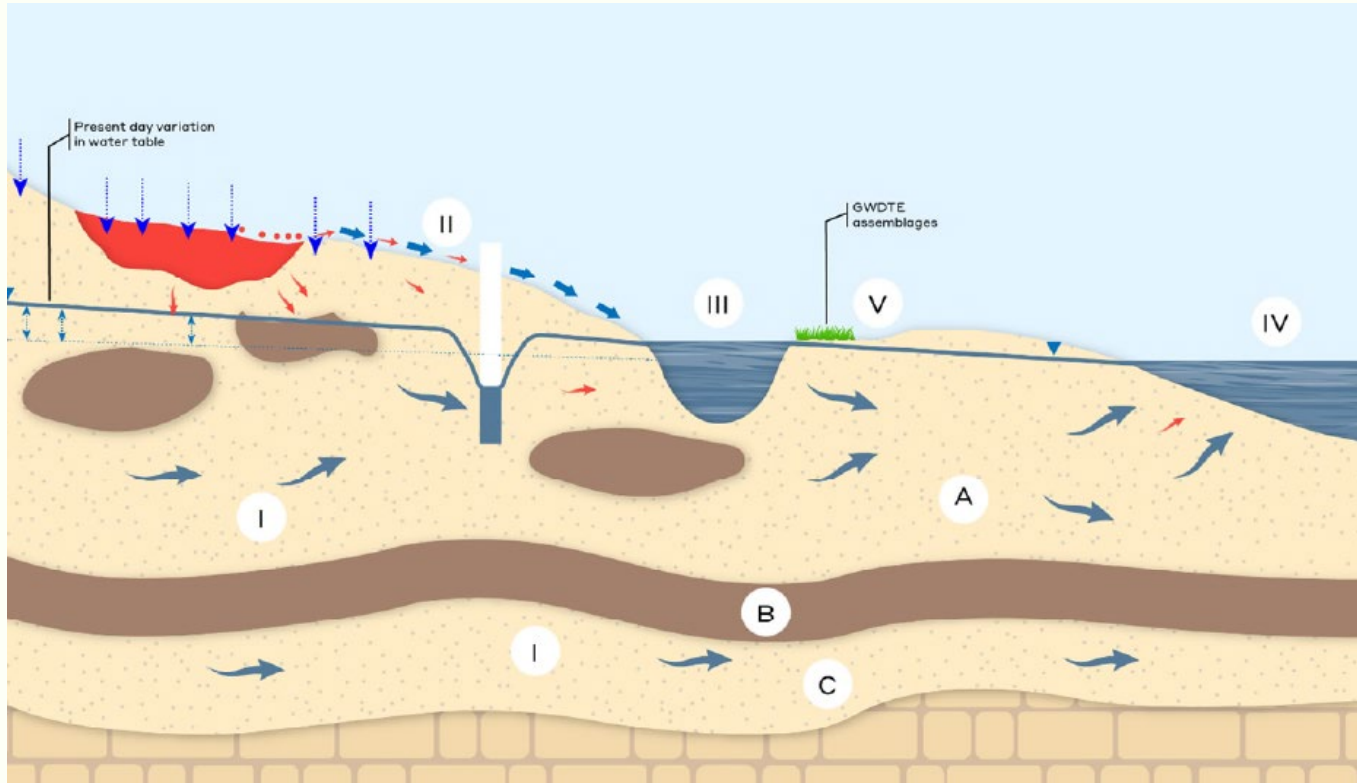


Source: Met Office UKCP18 based on RCP8.5 projections (global temp rise of 4.3°C – worst case)

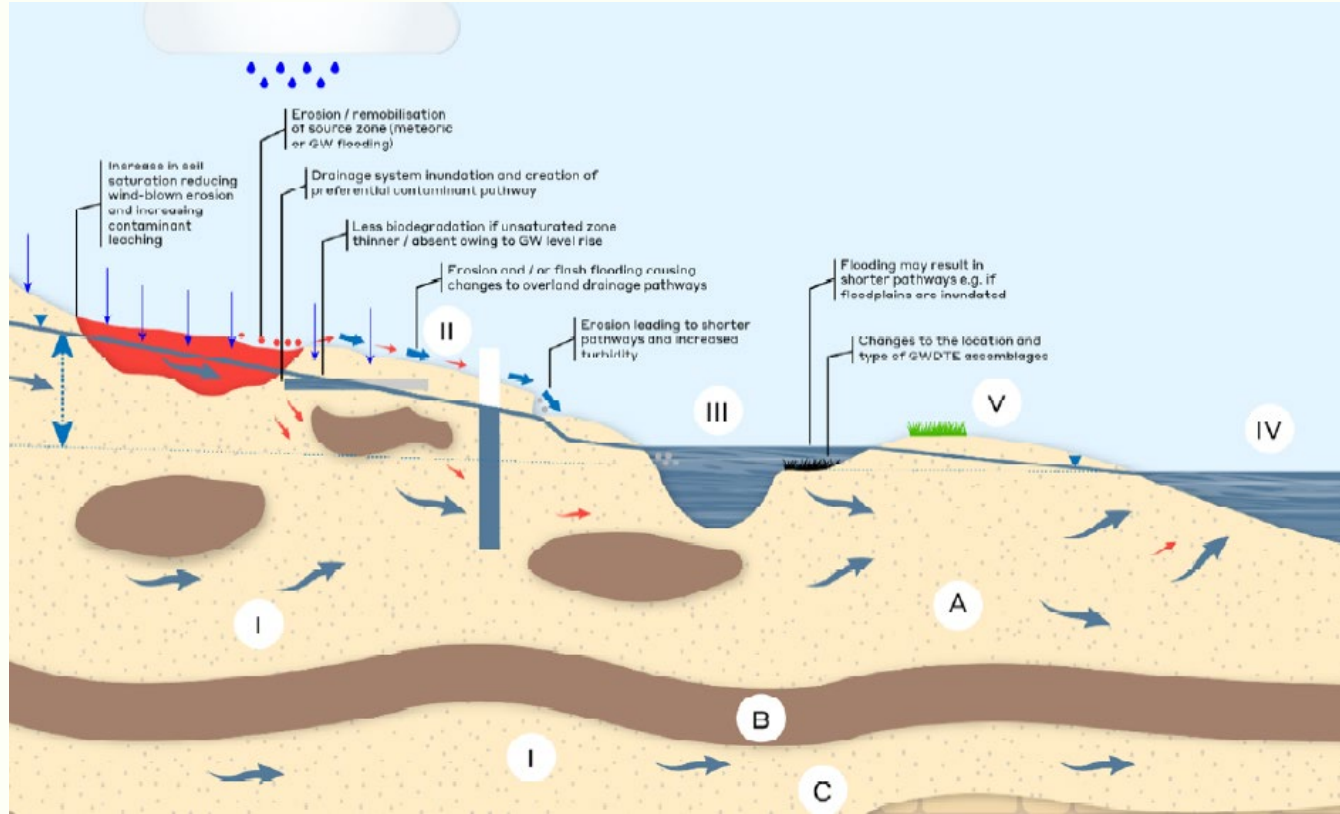
Revision due as IPCC published revised greenhouse gas emission data in 2021 (SSPs)



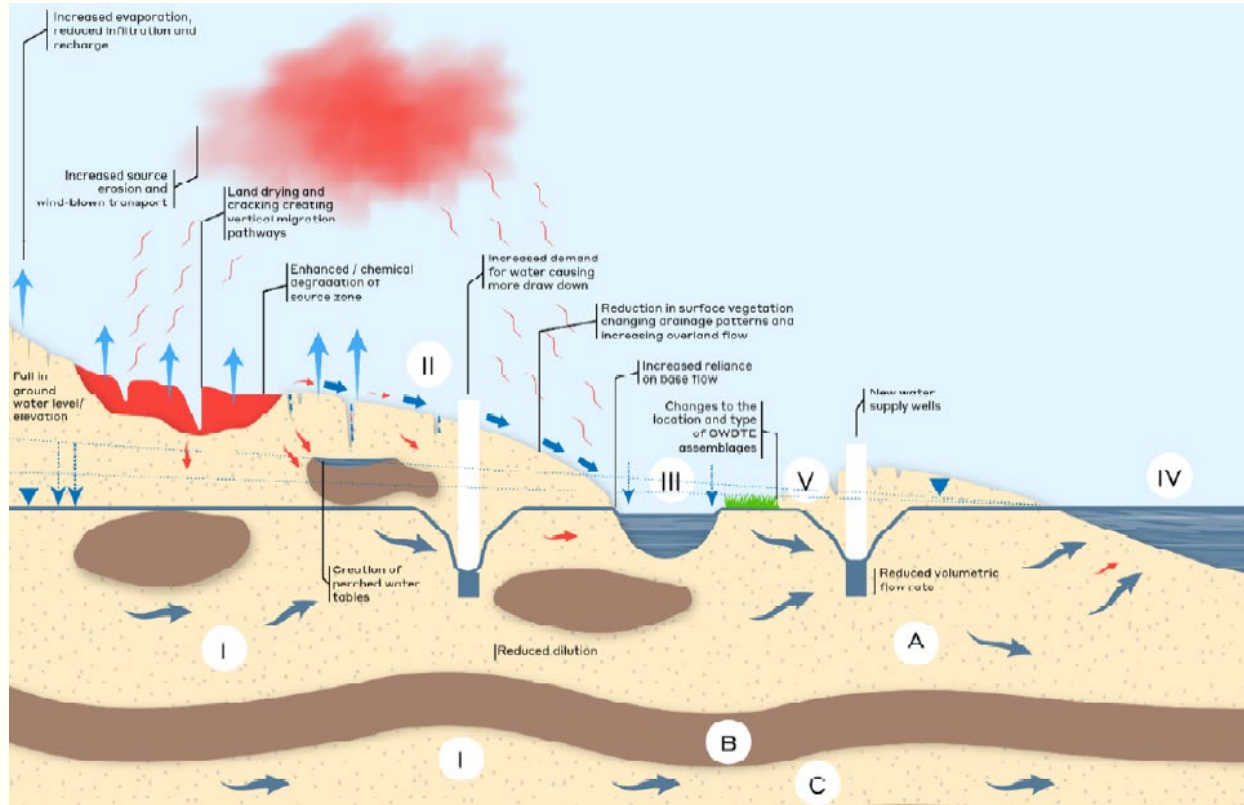
# Source-Pathway-Receptor (SPR) Pollutant Linkages



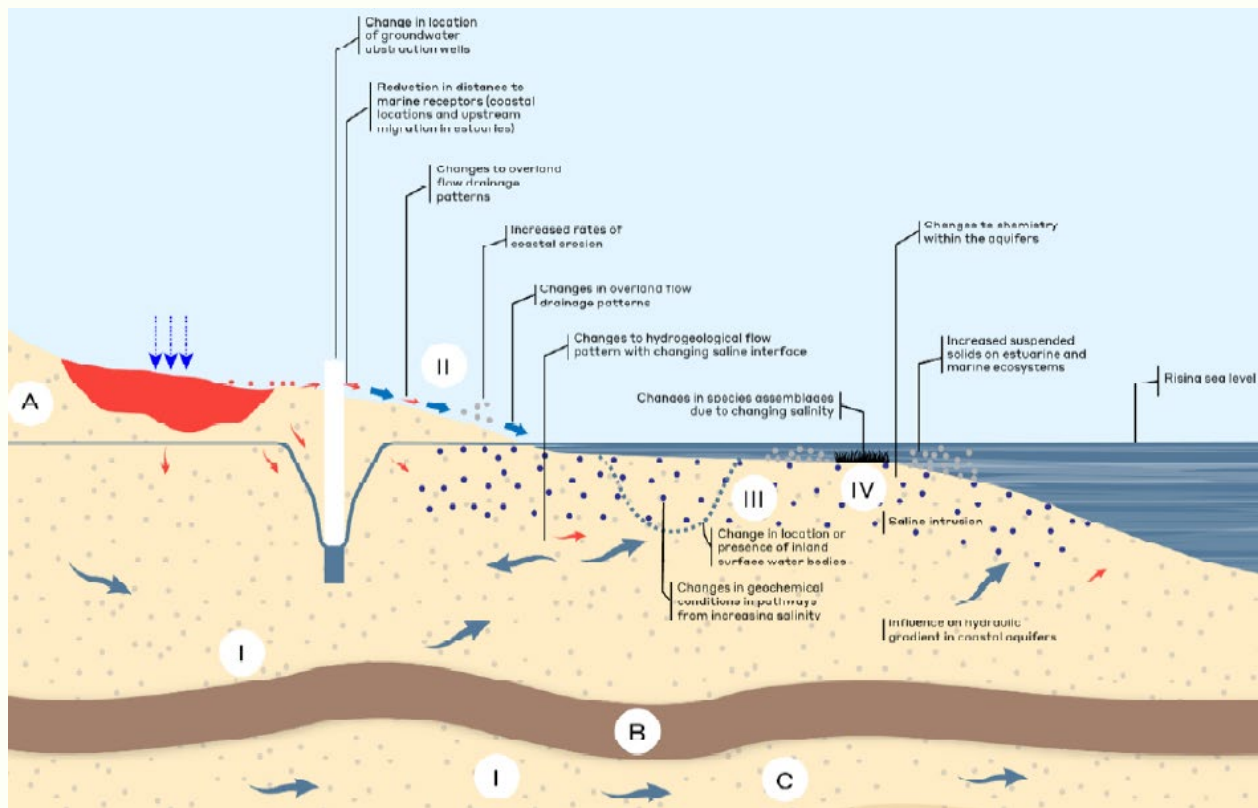
# CSM considerations – extreme rainfall events



# CSM considerations – extreme heat events



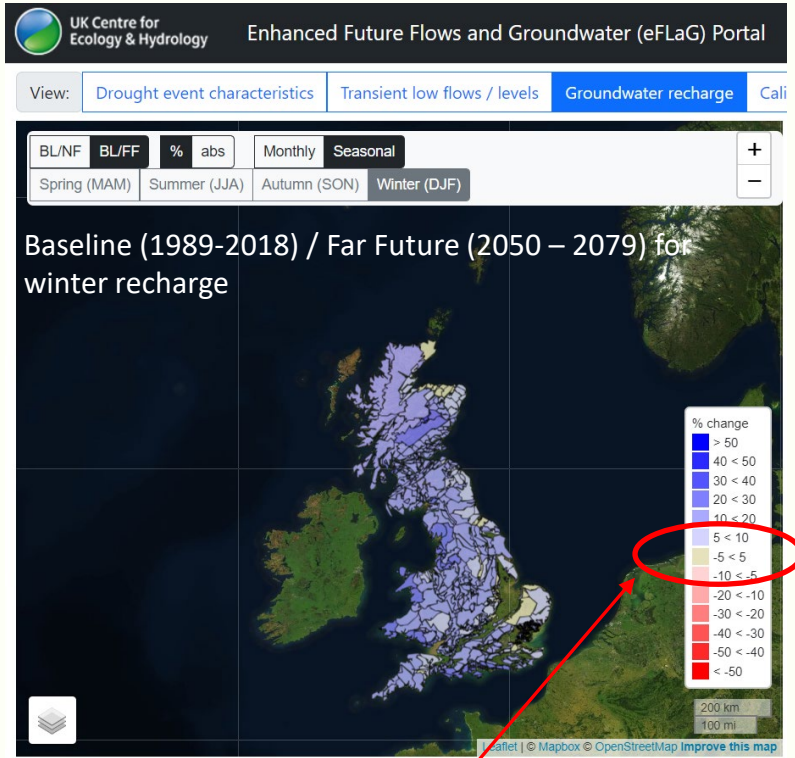
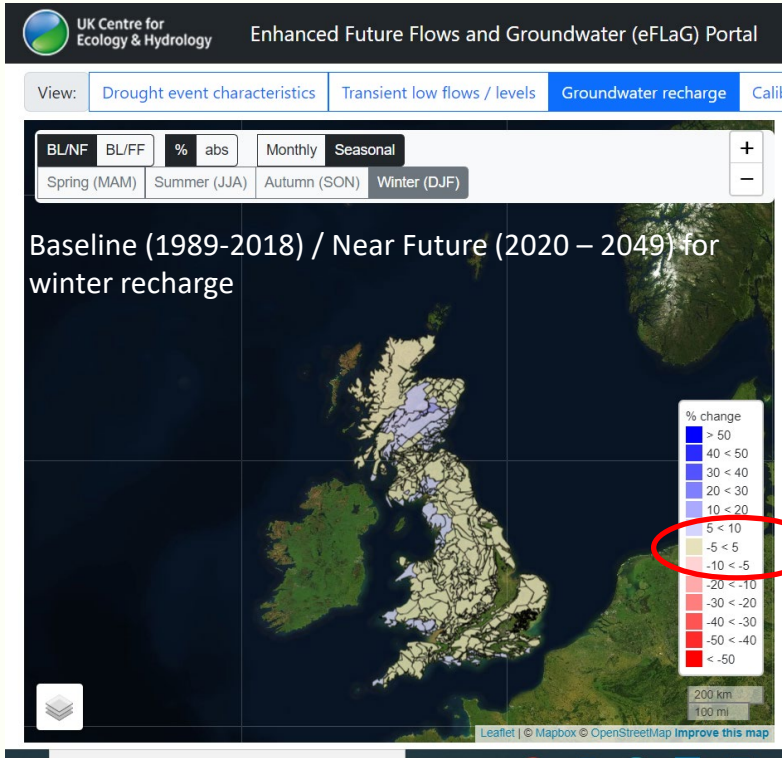
# CSM considerations – Sea Level Rise / Coastal Erosion



# Tier 1: PRA climate change considerations

- Design life of proposed development (if applicable)
- Location and elevation of the site in relation to the sea or estuaries and tidally influenced rivers (e.g. River Thames)
- The location and elevation of the site in relation to projected increased flooding extents
- Projected changes to groundwater recharge (e.g. as a result of increased winter rainfall and frequency of intense rainfall events or decrease in seasonal rainfall and drought conditions)
- The projected changes to regional groundwater level for defined time slices (e.g. near future to 2049 or far future to 2079)
- **Appendix 4 presents case studies based on hypothetical sites**

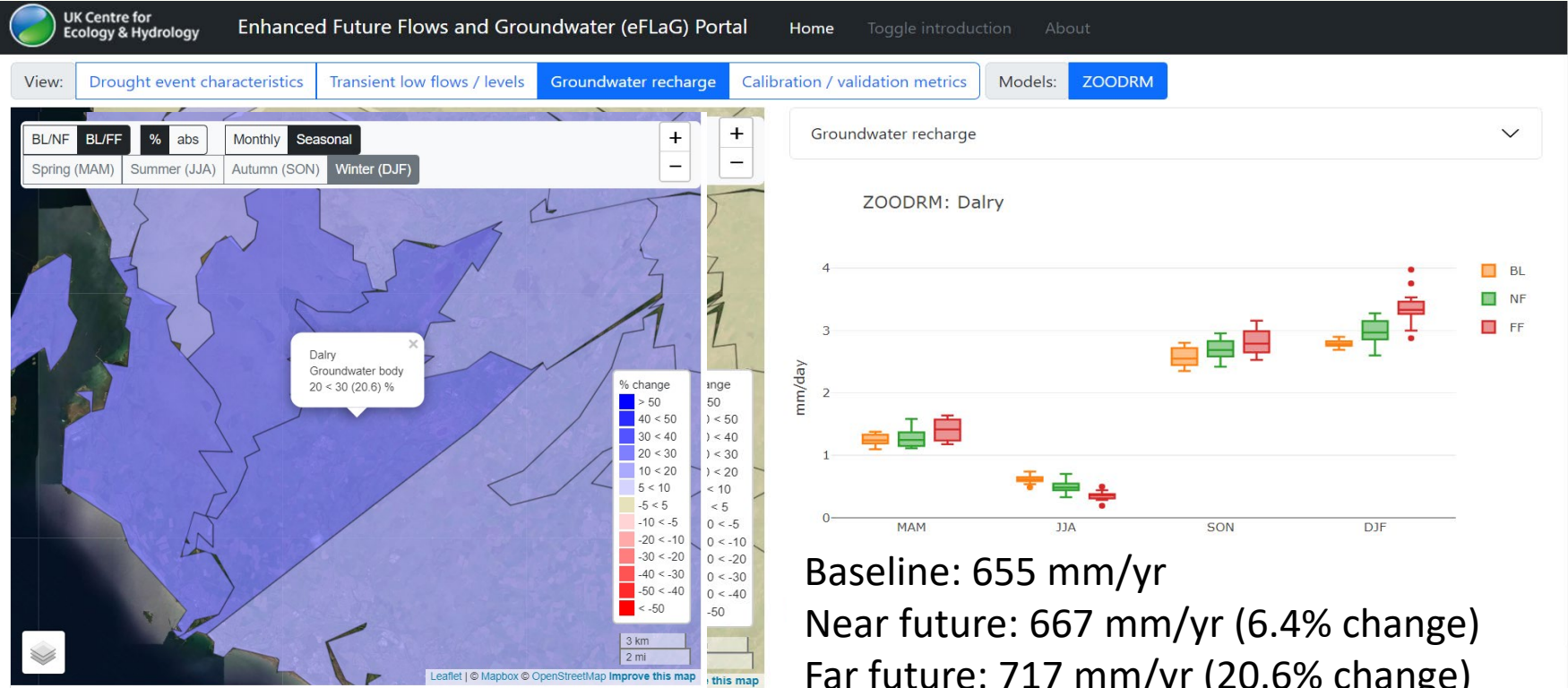
# Does climate change it matter?...Yes, but not always



5% change (potentially up to 10%) reasonably anticipated variation within risk assessment. It is the extremes that are most significant

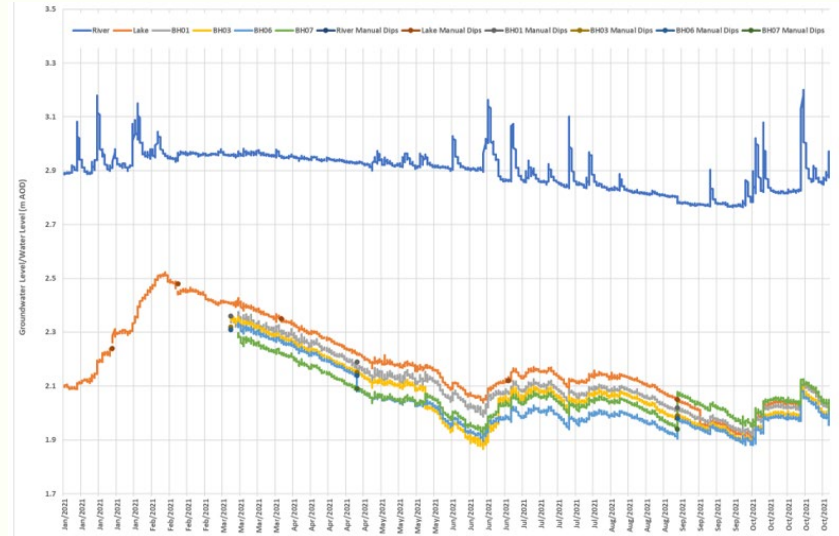


# Example Site



# Tier 2: GQRA climate change considerations

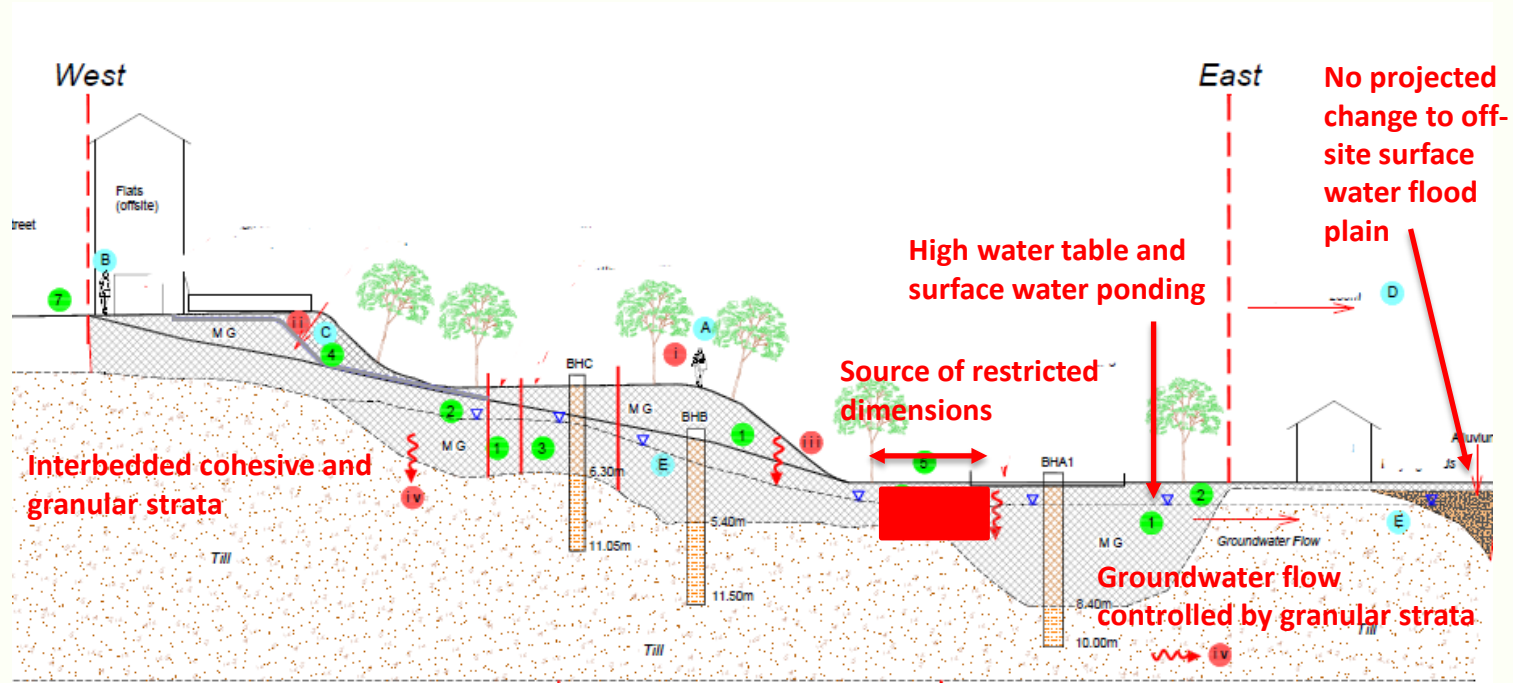
- Source delineation (lateral and vertical)
- Preferential flow pathways e.g. subsurface infrastructure
- Understanding of groundwater bodies:
  - unconfined or confined
  - granular or cohesive
  - unsaturated zone thickness
  - variation in groundwater level (seasonality)
  - transmissivity
  - hydraulic connection with surface water, wetland or existing abstraction
- Surface water flow regime – low flow conditions



**Consider “What-if” Scenarios as part of CSM considerations – Table 3-1 of guidance. Includes extreme weather events and long-term climate change effects.**



# Example Site



➤ Future climate change unlikely to have significant impact on risks to water environment

# Tier 3: DQRA climate change considerations

- Applicable where climate change has been identified as a relevant consideration following Tier 1 and Tier 2
- Only long-term climate change effects can be assessed quantitatively. Short term extreme weather events can only be assessed qualitatively via “what if” scenarios.
- Climate change is transient (median in flux) but commercially available models are not and projections only available to 2100
  - Model for specific time periods e.g. near term, 2050s and 2080s and combine results to allow coarse assessment
- Consider changes to sources (dimensions, concentrations), pathways (lengths) and receptors (designations)
- Sensitive hydrogeological parameters:
  - recharge
  - groundwater elevation => unsaturated/ saturated thickness
  - hydraulic gradient
  - Surface water flow
- Nature of hazard / longevity of risk – clear and obvious vs borderline

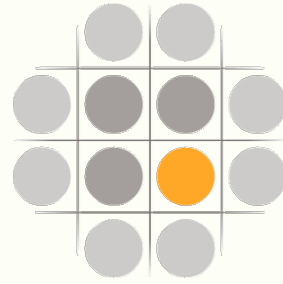
# Conclusions

- Climate science is complicated
- Guidance, data sets and regulatory policy is continually being reviewed, researched and updated
- Climate change effects may (*or may not*) fundamentally change the S-P-R linkages being considered:
  - source/contaminant behaviour
  - active pathways
  - proximity to / type of receptor
- Regional variability >>> site specific conditions
- Extreme weather events can only be assessed qualitatively (*update to guidance planned*).
- Long term climate change effects can be assessed qualitatively and quantitatively.
- Needs to be considered at all stages of assessment PRA>> (per LCRM update 20233).
- Good site characterisation is key to understanding potential future implications of climate change
- Incorporate climate change projections and explore consequences within risk assessment

**SoBRA Guidance** <https://sobra.org.uk/climate-change/controlled-waters-and-climate-change/>

# SoBRA

The Society of Brownfield Risk Assessment



# Thank You!

# References

- CL:AIRE Good Practice for Risk Assessment for Coal Mine Gas Emissions (2021) - <https://www.claire.co.uk/home/news/1561-new-cl-aire-publication>
- SoBRA Controlled Waters and Climate Change (2022) - <https://sobra.org.uk/climate-change/controlled-waters-and-climate-change/>
- SoBRA Summer Workshop – The Climate Emergency (2022) - <https://sobra.org.uk/category/summer-workshop-reports-s/>
- NHBC Future Proofing Against Climate Change (2023) - <https://www.nhbc.co.uk/foundation/future-proofing-against-climate-change>
- SuRF - <https://www.claire.co.uk/projects-and-initiatives/surf-uk>
- UK State of the Climate - <https://www.metoffice.gov.uk/research/climate/maps-and-data/about/state-of-climate>

# Data sources

- UK Climate Projections (UKCP) data - <https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/data/index>
- Climate Risk Indicators – <https://uk-cri.org/>
- eFLaG portal - <https://eip.ceh.ac.uk/hydrology/eflag/>
- SEPA future flood maps - <https://map.sepa.org.uk/floodmaps/FloodRisk/FutureFloodMaps>
- BGS GeoCoast and GeoClimate - <https://www.bgs.ac.uk/map-viewers/geoindex-onshore/>
- Coastal risk screening tool - [coastal.climatecentral.org/map](https://coastal.climatecentral.org/map)